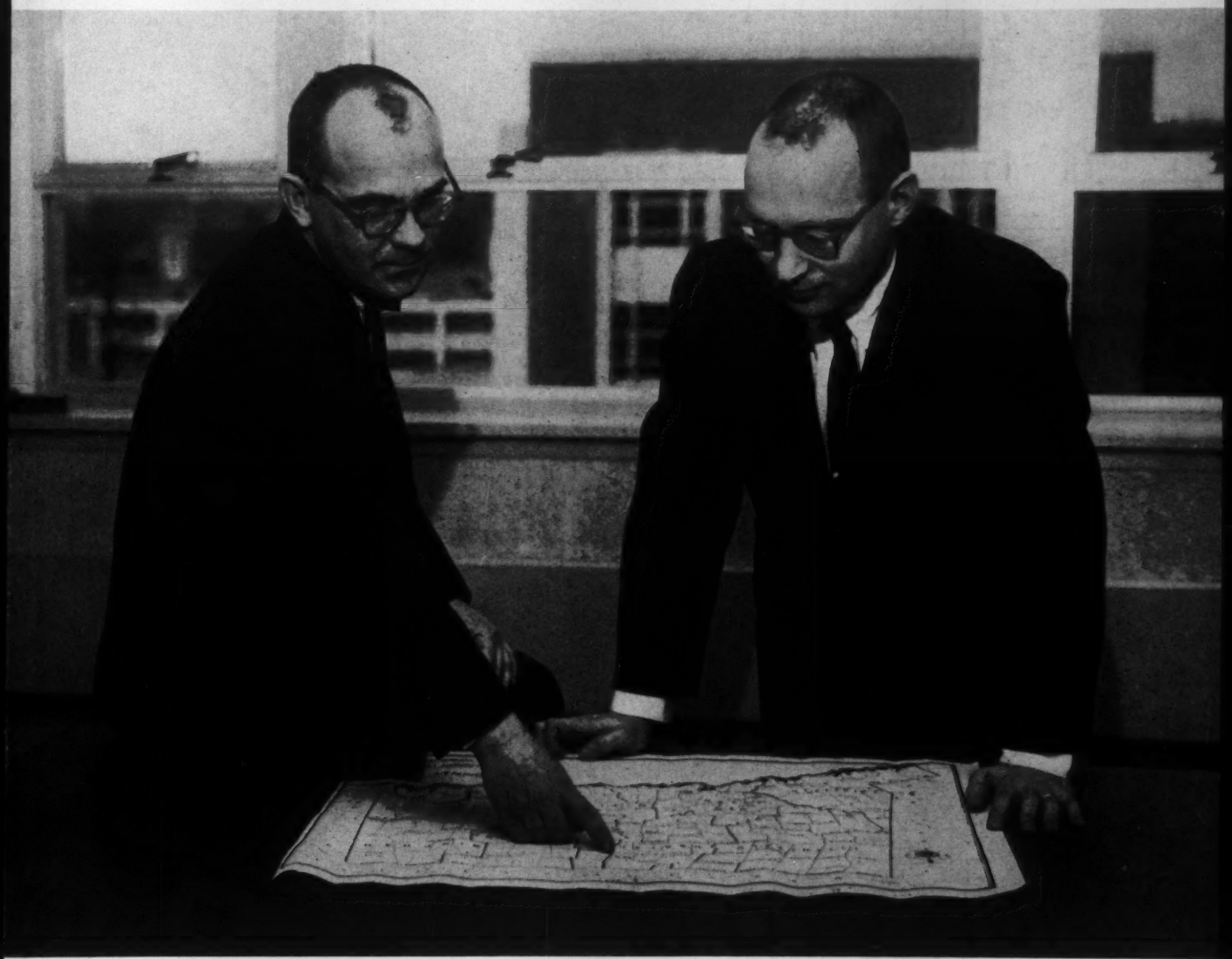
The IRON AGE

March 17, 1960 A Chilton Publication The National Metalworking Weekly



U. of Conn.'s Malinowski and Kinnard

Analyze Problems Of Metalworking's Suppliers P. 68

Is Research at Odds With Management – P. 61

Tape Control Makes Boring Mill Versatile – P. 99

Digest of the Week – P. 2-3

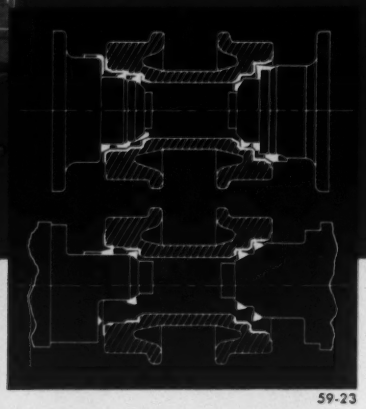
FROM ROUGH...

Heavy boring and plunge-facing

TO FINISH

Precision boring and facing

IN ONE MACHINING CYCLE



59-23

Ex-Cell-O Custom Machine—with quick-change tooling—speeds output of large, cast-iron track rollers

This Ex-Cell-O Custom Machine features precision—in a big way.

A track roller for rugged, off-the-road equipment, is clamped in the hydraulically-actuated fixture; the rest—from rough to finish—is automatic.

The part is first rough-bored on both ends at the same time. Then both slides retract and the fixture indexes into position for finish boring and facing at both ends, simultaneously. (Drawing, above-right, shows rough and finish tooling.) Slides again retract and the fixture is unclamped, ready for the next cycle. Easily changed tooling heads and clamping jaws permit precision machining of any of three similar components with minimum lag in production.

See your Ex-Cell-O Representative, or write direct for full details on Ex-Cell-O Custom Machines—specially designed with extended capacity for changing production needs.

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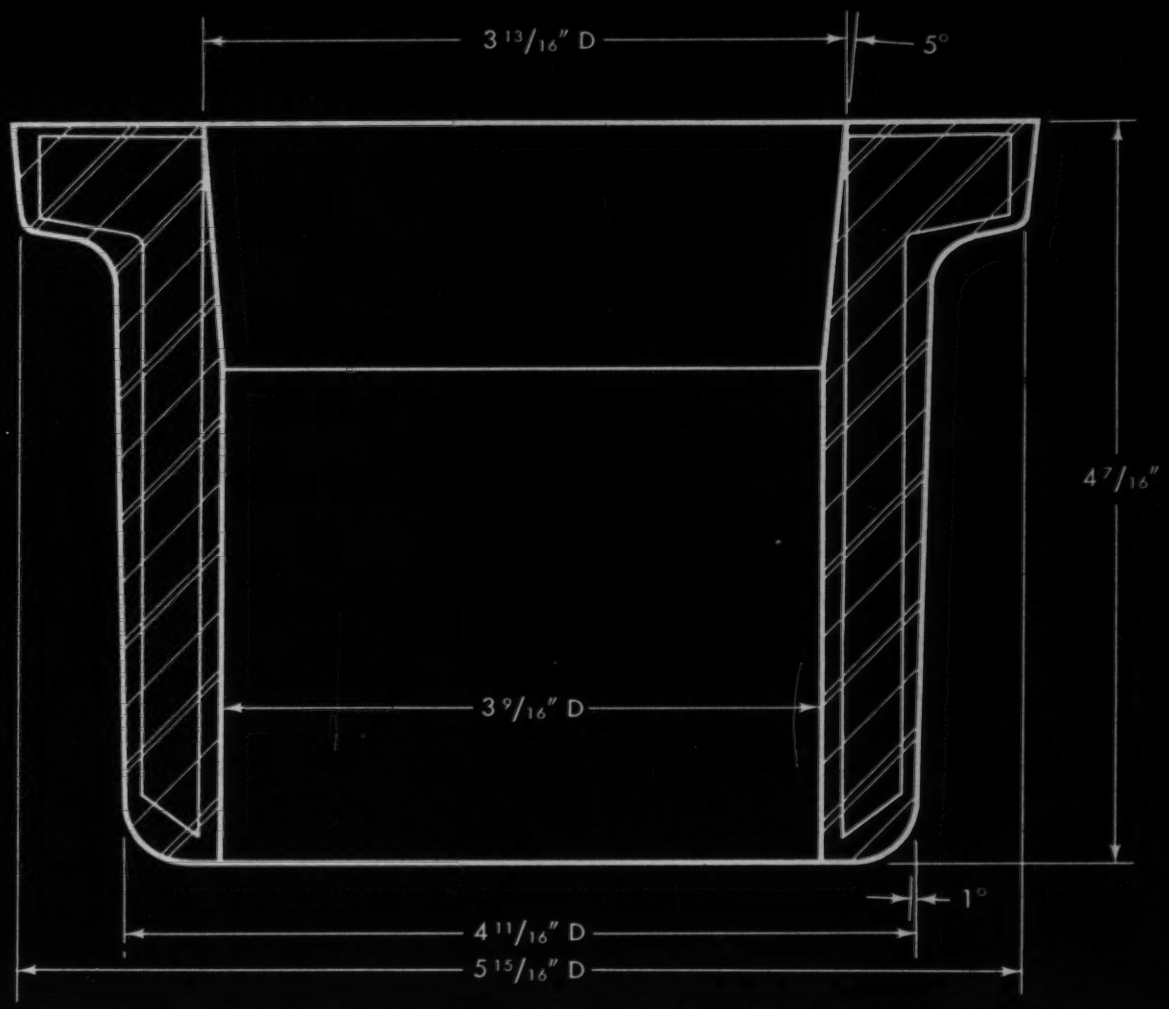

...to save metal and machining dollars

Forging with minimum external and internal drafts is a Bethlehem specialty. Witness the closure hub above.

We forge this part and others like it in a mechanical press to 1 degree outside draft, 5 degree inside draft. Then we hot-broach the inside draft to facilitate internal chucking. By the time this hub arrives at our customer's machine shop, little machining is required. Machining's a lot safer, easier, and faster, too. Because of the small drafts, chuck jaws can get a big bite on the part. They won't slip. Our customer can safely use higher horsepower machine tools, and speed his work.

Because we're able to forge to 1 degree drafts *or less*, the weight of the product can be reduced. That saves metal as well as machining dollars. We'd like to pass on similar savings to you. Call or write our nearest sales office today.

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The IRON AGE

March 17, 1960—Vol. 185, No. 11

Digest of the Week in

★Starred items are digested at right.

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News of the Industry

PROFESSIONAL EMPLOYEES

Need Special Handling?—It may be time for management to take a look at the way it handles its engineers and scientists. They have different motives and goals than they had in the past. P. 61

KAISER LABOR PLAN

First Meeting — Kaiser Steel's company-USWA-public committee on long-range labor program has

first meeting. Goals are set and ground rules laid out. Committee members are optimistic. P. 63

JAPANESE STEEL

Midwest Sales Drive—Japanese mills are starting an all-out drive for more sales in the Midwest. Two have opened sales offices there, with more expected to follow. P. 64

RELIABILITY ENGINEERING

Grows in Importance—This relatively new concept has evolved from conventional test procedures to meet the exacting needs of space-

Metalworking

Cover Feature

MANY PROBLEMS: Small suppliers face a host of problems in trying to stay in business. Dr. Z. S. Malinowski and Dr. W. N. Kinnard, Jr., of the University of Connecticut prepared the special survey report on the small supplier. Part I of this two part series begins in this issue. P. 68

age developments. But it is becoming increasingly important to other metalworkers. P. 66

WASHINGTON

Price Plateau — Government economists predict that prices will remain steady for the rest of the year. Only a few increases are expected. P. 81

Engineering-Production Developments

TAPE-CONTROLLED BORING

Can Earn Its Keep—Developed and designed from the machine user's viewpoint, tape controls are adding versatility while reducing set-up time in boring mill operations. Building blocks of the down-to-earth approach are plug-in electronics and standard parts. And it's a jigless system. P. 99

COBALT INSPECTION

Spots Casting Flaws — Valves destined for atomic power plants have to be sound. Cobalt-60 radiography provides inspection on production scale. The unit can get down to 1-pct sensitivity in radiographing steel castings with thicknesses ranging from 2 to 10 in. from a distance of 66 in. P. 102

JET ENGINE OVERHAUL

Simplified—A lot of machining is needed to keep a fleet of 58 jet airliners in service. One company is improving its engine maintenance program with a single machine that grinds, bores, faces and turns. The unit is big enough to handle turbine engine diffuser cases. P. 104

SOVIET MACHINE TOOLS

Bank on Research — Current production of machine tools in the Soviet Union is reaching dangerous heights. Russia is said to be the only nation mass producing these tools. The secret lies in the USSR's vast network of production-geared research labs. P. 106

CONTINUOUS CASTING

Fills the Bill—Engineers swung to continuously-cast bronze to operate nine sluice gates in a flood control project. These 20-ft long stems are each 4½ in. in diam and weigh 1300 lb. It's the first time such large sizes have ever been cast by the continuous method. P. 110

Market and Price Trends

STEEL FOUNDRY SALES

Optimism Still Rules — Steel founders, gathered for their annual meeting, showed plenty of confidence about 1960 sales. But imports and rising pressures on producing costs are problems. P. 65

COMPACT TRUCKS

On the Way—Ford's new Valiant Ranchero will go on sale March 30. It is the first American made compact truck. But others are expected on the scene before too long. P. 77

MACHINE TOOLS

Missile Machining—Bullard machine uses dual tracer controls to machine missile nose cone. Utilizing standard components keeps the unit's cost remarkably low for a special purpose tool. P. 85

STEEL SUMMARY

Market Normal—For the first time in years, normal market conditions prevail. It means that short-term factors will determine steel operations, rather than the extremes of the post-war period. Incoming orders are slow, but April will be a good month. P. 143

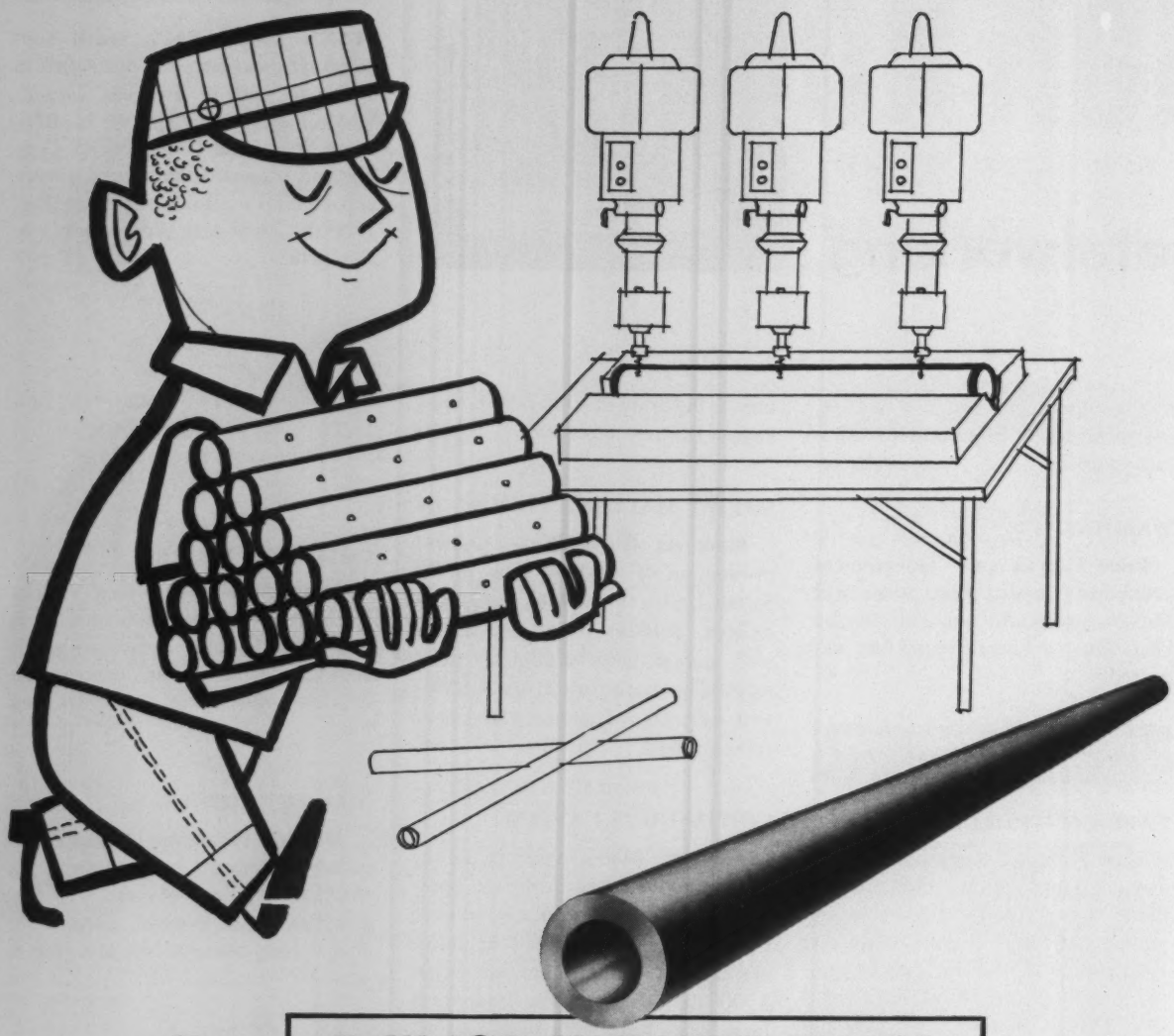
NEXT WEEK

PLANT SPENDING SURVEY

Steel, Autos Lead—Capital spending by the steel and autos is on the upgrade, according to The IRON AGE's latest survey of metalworking capital appropriations. But the overall momentum is slowing.

BREAK-EVEN CHART

Plotting the Future—All companies, big and small, rely heavily on today's decisions for tomorrow's growth. Next week's technical feature shows how break-even charts can test in advance the effect of management's decisions.



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With B&W Job-Matched Tubing for mechanical applications you get:

- ... the right choice from a wide range of analyses, sizes, tempers, and finishes to exactly meet fabricating requirements
- ... consistently uniform wall thickness, diameter, and concentricity to simplify fabrication
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Whatever your requirements, B&W Job-Matched Tubes can help keep your fabricating costs down.

For complete information about B&W Job-Matched Mechanical Tubing call the local B&W District Sales Office or write for Bulletin TB-352. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

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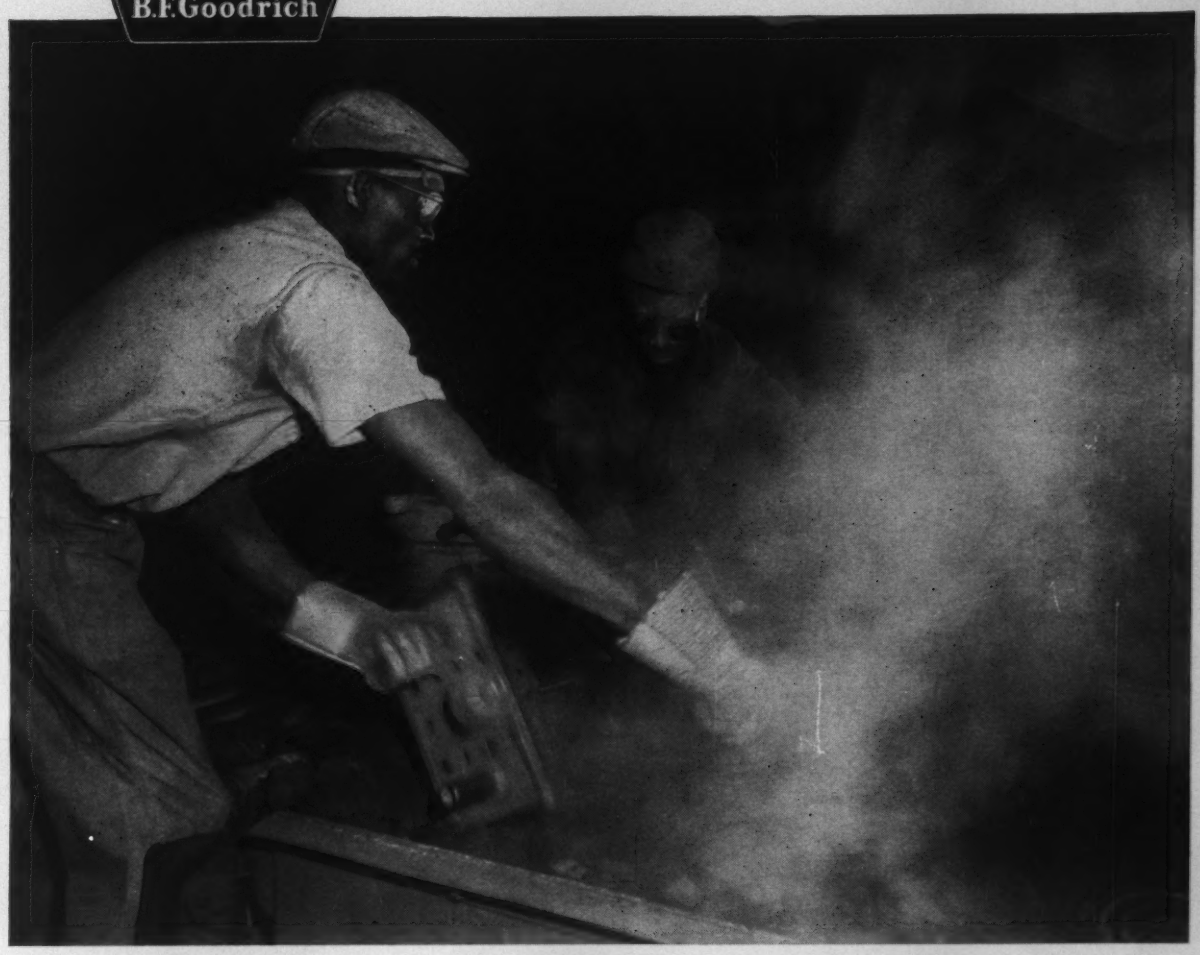


Where belts carrying hot sand now last 50% longer

THOSE men are dumping hot sand from molds into a shake-out grid. The 250-degree sand falls through the grid and down on a conveyor belt nine feet below. But the heat is so intense it even blistered and scorched rubber belts that were supposed to have been specially designed for hot-material service. Belts were only lasting 3 or 4 months.

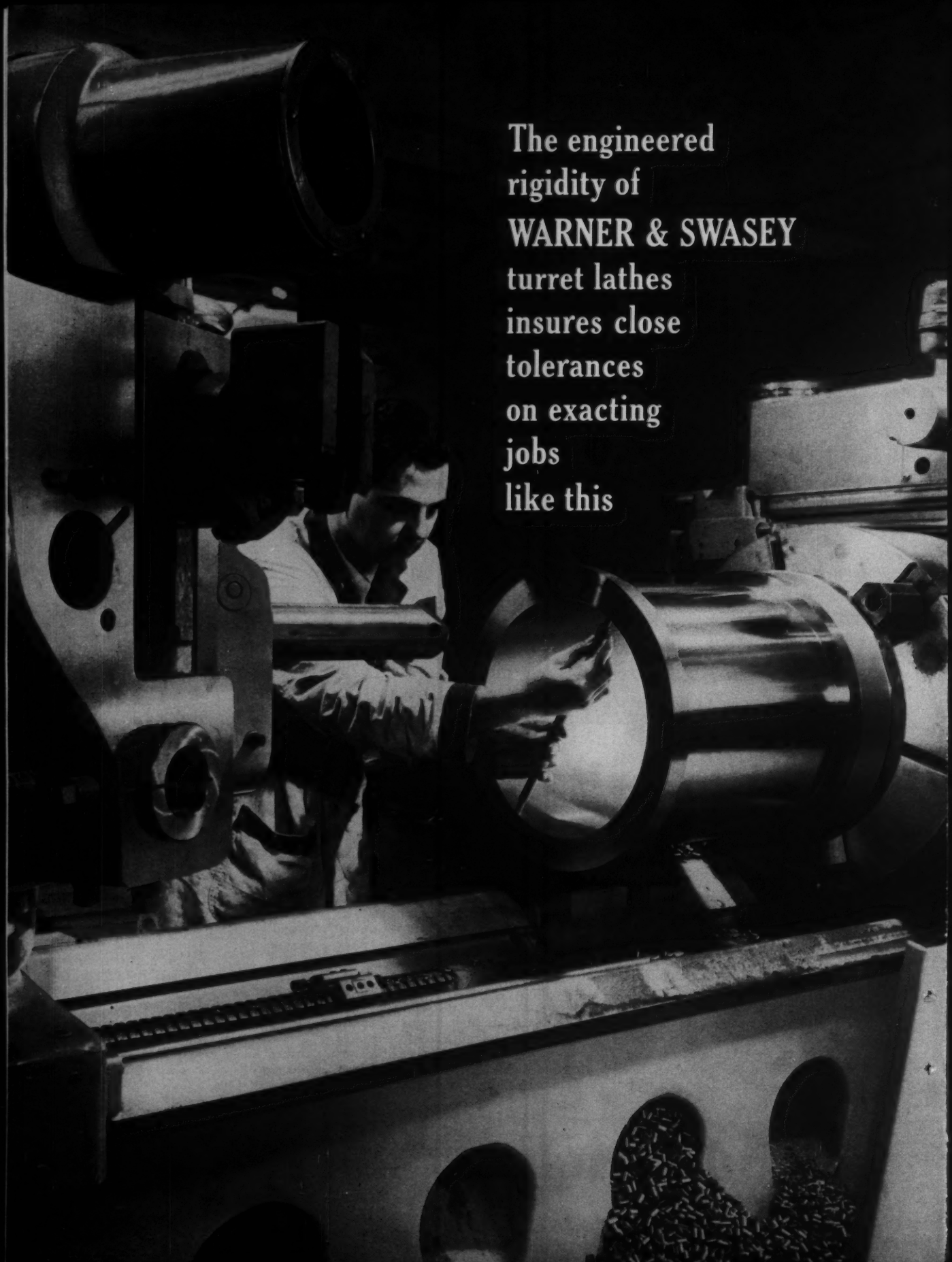
When a B.F.Goodrich man heard of the problem, he recommended a new conveyor belt called Solarflex. This B.F.Goodrich belt is made of a special rubber that stays soft and pliable at temperatures that cause other belts to harden, crack and finally break down.

Since 1954, B.F.Goodrich Solarflex belts have been used exclusively on this job. Because of their greater resistance to heat, they last from six to nine months—a 50% increase in belt life.

In this plant, the maintenance supervisor had a good rule which hundreds of others like him follow. Instead of accepting the high cost of frequent replacements, he called in a B.F.Goodrich representative and found exactly what he needed to cut costs and keep the foundry running with fewer shutdowns and delays.

Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich belt described here. And, as a factory-trained specialist in rubber products, he can answer your questions about the many rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Co., Dept. M-811, Akron 18, Ohio.*

B.F.Goodrich ***industrial rubber products***


The engineered
rigidity of
WARNER & SWASEY
turret lathes
insures close
tolerances
on exacting
jobs
like this

The Five Percenters: How Do They Get That Way?

There is a lot of hot air floating around about our national progress. Of course, there is some serious and thoughtful questioning too. But it's in the minority.

Some talk about our national slowdown is so much hogwash. Figures which in themselves are suspect are used to show how we have slowed down since, say, 1952.

Some people say we ought to show a 5 pct growth each year. Maybe we should. We did after World War II because there was a vast buildup of demand. When it was filled, we dropped back a little. No matter what figures are used or how they are interpreted, that's about the way things size up.

Many want us to "forward, march" under forced draft. Usually this means more government hands in our pocketbook or do's and don'ts from those who like to push others around.

Before we get in line for bigger debts, let's question a few of our past fiscal "miracles." Before we let Big Brother further into our tents, let's see what he has done so far. It is only by checking up on past utopian schemes that we can assess what the 5-percenters want to do to us—and with us.

First off, we ought to be ashamed to have hog-tied ourselves with the horrible farm surplus monster which is eating us out of house and home and into debt for years to come. Not only actual money debt, mind you, but moral debt too.

Then what about our national debt? Even in our best years we do nothing about it. Will our goose-step approach via government manipulations to the "better life" increase or decrease our national debt? You guess.

Will our emotion-tinged and at times social-worker-approach to foreign aid do for us what we hope it will? Or have we bungled this over the years to where it is a habit, a hidden handout and perhaps an insult to those we aid?

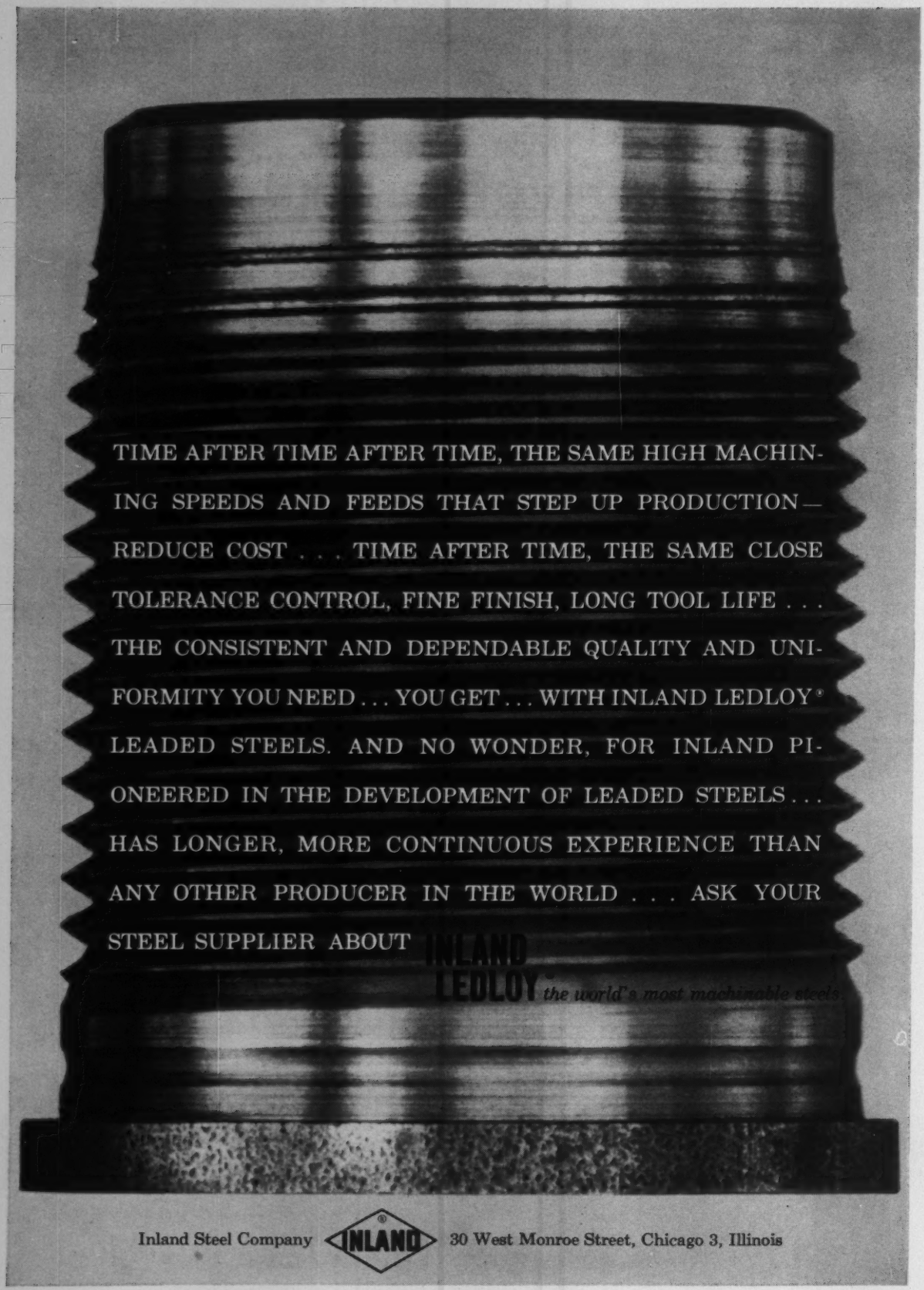
Are we to keep our army of bureaucrats for ever? Don't blame them. Any job-holder will move heaven and earth to protect his job. How many more will we add to payrolls paid by taxes as we head for the land of even more milk and honey?

Before we blindly strike out to meet some fictitious slide-rule national bogey, we should take stock of what we have done to ourselves, to our government, and to our future citizens.

Let's clean that up first!

Tom Campbell

Editor-in-Chief


TIME AFTER TIME AFTER TIME, THE SAME HIGH MACHINING SPEEDS AND FEEDS THAT STEP UP PRODUCTION—REDUCE COST . . . TIME AFTER TIME, THE SAME CLOSE TOLERANCE CONTROL, FINE FINISH, LONG TOOL LIFE . . . THE CONSISTENT AND DEPENDABLE QUALITY AND UNIFORMITY YOU NEED . . . YOU GET . . . WITH INLAND LEDLOY® LEADED STEELS. AND NO WONDER, FOR INLAND PIONEERED IN THE DEVELOPMENT OF LEADED STEELS . . . HAS LONGER, MORE CONTINUOUS EXPERIENCE THAN ANY OTHER PRODUCER IN THE WORLD . . . ASK YOUR STEEL SUPPLIER ABOUT
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Springs Aid Heat Treat

Spacer springs of H-11 die steel minimize distortion of thin-gage aluminum sheets during heat treating. Inserted at top and bottom of the coiled thin-gage aluminum sheets, the springs are stretched to facilitate coil placement. Tension is then released. This fixes the coil firmly for heat treat processing. The springs retain their tension through hundreds of heating cycles.

Control Manual Machining

Installation of simple load meters on hand-fed machine tools allows operators to control all major variables affecting the work. Each load meter measures the amperes drawn by the machine's motor. Meter readings are read as a percentage of rated motor capacity. Using the meters, even manual feed rates can be controlled.

No Senate Steel Probe?

The steel industry may not have to go through another congressional hearing this year—even if prices are raised. Sen. Estes Kefauver's Senate Antitrust subcommittee is busy with a drug industry probe. It won't be stopped until milked dry. And the Senator faces a tough re-election battle in an August primary, so he'll be busy. Aids say it will be 1961 before he starts any new steel probe.

More High-Voltage Welding

At least 10 high-voltage electron beam welding guns should be in action in the U. S. by the middle of 1963-64. These units, which operate at 100,000 v, are going into special applications aimed at stepping up the U. S. space program.

Aluminum From Africa?

Aluminum producers around the world are convinced that because of tremendous deposits of bauxite and large sources of untapped water power—both near the coast—Africa will someday be among the world's biggest aluminum producers. There are many obstacles, but talks now in progress, could result in a giant consortium. Several large U. S. producers will be among the members.

Water Cleans Hot Furnace

High-pressure water, from a portable trailer-mounted pump, cleans hot brickwork in open-hearth furnace "checkers" at the Great Lakes Steel Corp. The pump discharges water, from the mill's supply lines, through a multi-orifice nozzle at 970 psig. Cleaning is done in less than 8 hours. Previously, it took 8 days to manually chisel off the buildup and replace the refractory roof—every 3 months.

Automation for Aluminum

First production line for conventional engine blocks of aluminum is now being readied at a major automotive plant. It's said to be a conventional transfer line. Rebuilding calls for new tooling and other modifications to take advantage of higher cutting speeds possible with the light metal.

Braze Thin-Wall Tubing

Problems connected with stainless steel thin-wall tubes for heat exchanger cores are being solved by using a nickel-base, stainless-type, brazing alloy. Brazing is conceded to be the best fabrication method for this application; but two problems arise. The thin-wall sections allow little brazing alloy diffusion. And they're readily distorted. Being boron-free, the new brazing alloy suits this high-temperature work.

Use of Cast Zinc Soars

A major automobile producer expects to increase use of zinc diecastings by 200 pct on 1961 models. Greatest boost will come from interior decorative-functional panels in which the zinc diecastings replace steel. Reports are that a number of press makers are buying into diecasting organizations. This is viewed as part of a trend away from stampings into castings of various kinds.

MIRRO'S GOAL:
DOUBLED OUTPUT IN NEXT DECADE

MIRRO'S CHOICE:
LOEWY ROLLING MILLS

Mirro Aluminum Co., Manitowoc, Wis., recently dedicated its new rolling mill facility, the first fully integrated plant of its kind in the state. Since its aim is to double sales in the next 10 years by increasing the output of its existing products and by high-volume production of newly developed lines, Mirro knew it needed superior rolling mill equipment . . . equipment that can handle the *entire* job with optimum efficiency every step of the way.

The choice was Loewy.

A Loewy two-high reversing hot breakdown mill will roll 5000-lb. slabs down to thin plate and coil strip. A Loewy four-high cold finishing mill will reduce the hot-rolled strip to finished sheet gage suitable for the manufacture of cooking utensils, electric housewares, toys, boats, portable utility houses, and a host of products for the construction field.

A high-speed Loewy Hydromil will further reduce part of the strip production to household and packaging foil gages and, if required for other applications, to foil as thin as .00025 in.

Loewy specially designed rolling mill and auxiliary equipment for hot and cold working of ferrous and nonferrous metals are in operation throughout the United States and many foreign countries. If you want to expand your production economically and improve product quality, let us know your requirements. Write Dept. A-3 for further information and literature.

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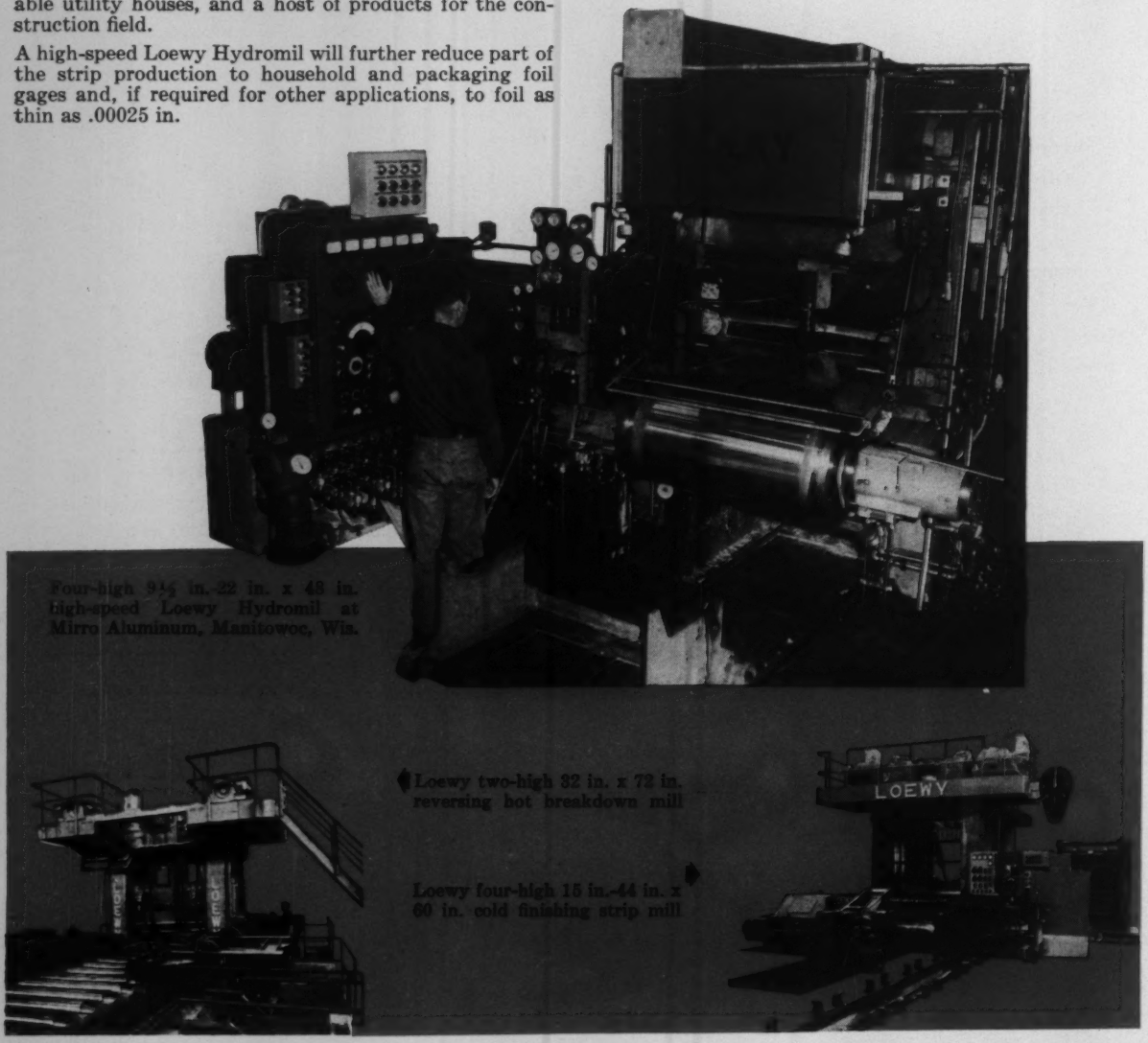


Four-high 9½ in.-22 in. x 48 in. high-speed Loewy Hydromil at Mirro Aluminum, Manitowoc, Wis.

Loewy two-high 32 in. x 72 in. reversing hot breakdown mill

Loewy four-high 15 in.-44 in. x 60 in. cold finishing strip mill

Cat Food—SIC 3567

Grocery stores always keep cats but did you know that cat food may also be an expense item in metalworking?

We have a letter written by E. G. Hoch, Jr., executive vice-president of the Drever Co., to a steel company. The latter asked about using sand to keep the atmosphere in a Drever furnace for bright annealing tubing.

The Hole Problem—In any atmosphere furnace you have the job of keeping a seal as the product emerges into the air. With tubing it is complicated by the hole in the tube. So you push the tubing through something that will give, but let the tube through. Sand is sometimes used but it sticks to the tubing and damages the dies.

Some shops use fried wheat hulls, some use fried rice hulls. Some use a 50-50 mixture of cracked corn and bran, others use a fullers earth type absorbent.

But if you plan to use wheat . . . well, we quote from Mr. Hoch's letter: "Posen & Kline Tube Co. is now using wheat. They had a problem with rats and have now employed two (2) cats full time. Don't forget to add cat food to your operating expenses!"

Foil the Rats — Or, as Mr. H. suggests, you can use a fullers earth absorbent. You may know these as the stuff you put on greasy floors ("Speedi-Dri, Hi-Dri, etc.)

A Satellite Industry

Almost everyone in metalworking does business with small suppliers. But almost no one thinks of them as a group with common problems, common goals, and many mutual interests.

In fact, as a group, we think they are sadly neglected.

Two Man Team—That's why, a short time ago, we were intrigued by a study of the valuable but neglected group. It was done by two University of Connecticut School of Business Administration professors.

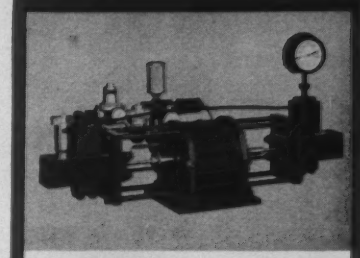
The two, Dr. Z. S. Malinowski and Dr. W. N. Kinnard, Jr., researched, surveyed, and examined a cross section of metalworking small suppliers. The result was what they call "The Metals Service Industry: A Case Study of a Satellite Industry."

A Request — We were so intrigued that we asked the two professors to prepare a two-part series on the small supplier, based on the results of their survey.

Part I of the series starts on P. 68. It deals with the problems of the small supplier that are present in the nature of the business itself. Next week, we will follow up with Part II, which will cover the problems of management.

"Don't worry, Pete, I'll bet there are plenty of girls in the plant who'll be glad to go out with you."

ALDRICH
AIR-DRIVEN HYDRAULIC PUMPS



For production service: Heavy duty 6-inch stroke pump, single or double acting.

For production or laboratory . . . handling small volumes of fluid at pressures up to 50,000 psi.

For hydrostatic testing . . . tubing, valves and pressure vessels.

For operating hydraulic presses, cylinders and valve positioners.

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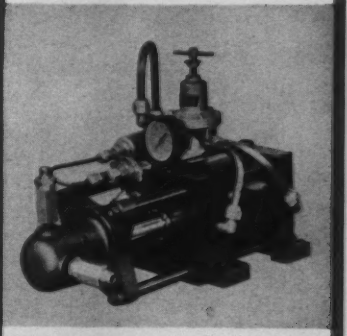
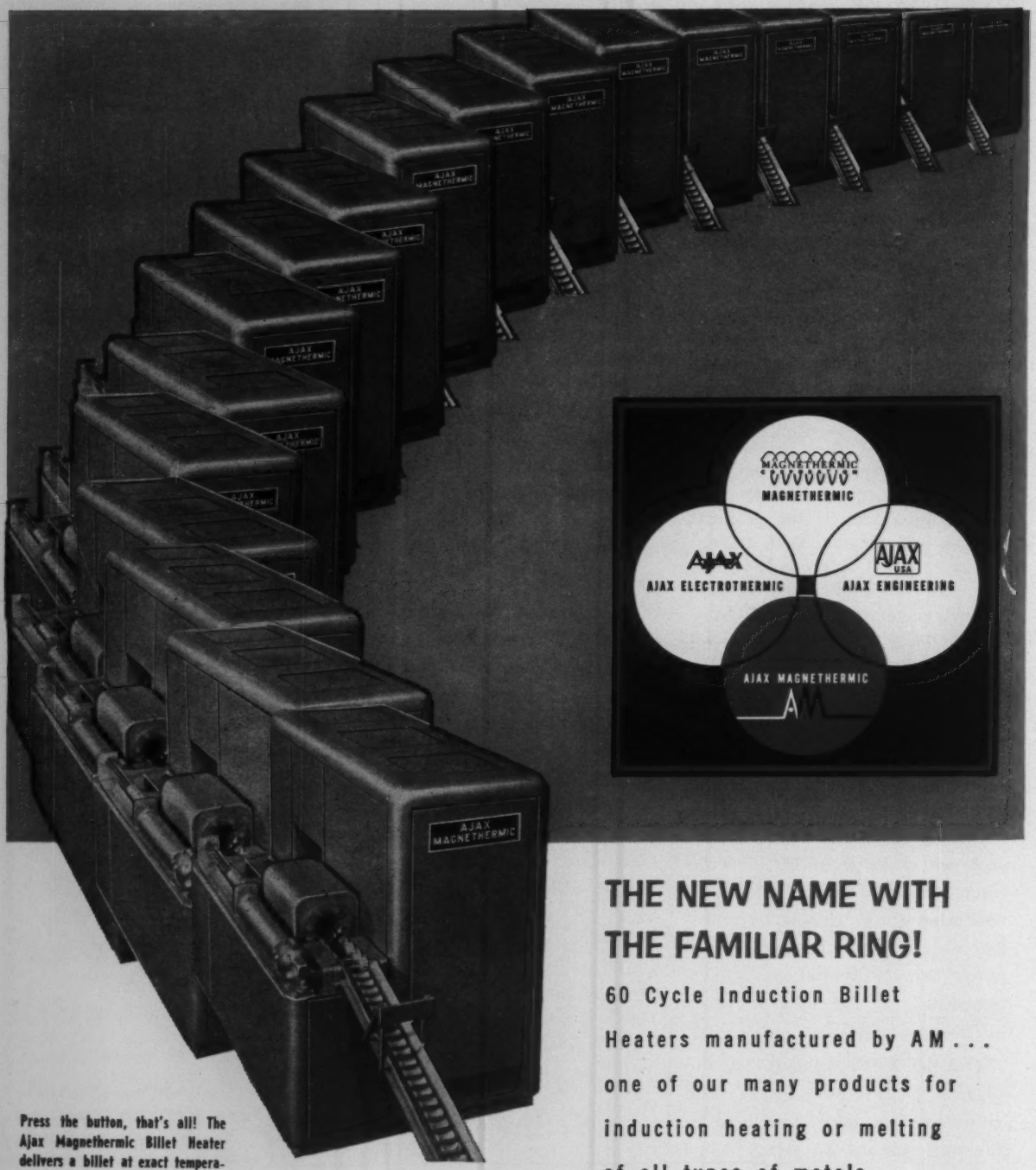


For intermittent service: 3-inch stroke pump has low first cost, high reliability.

Aldrich air-driven hydraulic pumps operate on normal plant air. They are compact, simple to install, economical to operate. Write today for Data Sheet 36 (6-inch stroke) or Data Sheet 36A (3-inch stroke).

ALDRICH

ALDRICH PUMP COMPANY
8 PINE STREET, ALLENTOWN, PA.



Press the button, that's all! The Ajax Magnethermic Billet Heater delivers a billet at exact temperature to the extrusion or forging press.

THE NEW NAME WITH THE FAMILIAR RING!

60 Cycle Induction Billet Heaters manufactured by AM . . . one of our many products for induction heating or melting of all types of metals.

"induction heating is our only business"

AJAX Magnethermic CORPORATION

GENERAL OFFICES
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TRENTON DIVISION
930 Lower Ferry Road
Trenton 5, New Jersey

YOUNGSTOWN DIVISION
3990 Simon Road
Youngstown 1, Ohio

For Distribution

Sir—Your editorial "The Fabulous Competition: Better Get Ready for It Now" which appeared in The IRON AGE March 3 issue is very interesting, and I should like your permission to reproduce some thirty-five copies for distribution to our own local and branch management personnel. — E. B. Carter, President, Wheeling Corrugating Co., Wheeling, W. Va.

Permission is granted.—Ed.

An Apology

Sir — We refer to the article entitled, "Fastener Makers Tool Up for Higher Speed, Lower Costs," by T. M. Rohan.

On page 23, we note that Waterbury Farrel's 3/16″ Headmaster is identified as a high speed Zagar nut tapper whereas the Zagar Tapper is identified as a Waterbury Farrel Headmaster. We appreciate that unavoidable errors occur. However, we do not feel that the misplacement of captions is justified in this instance as both machines are identified in their photographs by the name plates of their makers.—P. Robinson, Jr., Sales Assistant to the President, The Waterbury Farrel Foundry & Machine Co., Div. of Textron Inc., Waterbury, Conn.

Our apologies for transposing captions.—Ed.

Warehouse Prices

Sir—I am not in the habit of writing to magazines but since I do the steel buying for my company I cannot help commenting on the article "New Warehouse Prices in Effect" in the February 25 issue.

I wonder if the actual operation of these new prices was checked carefully before the article was written or if the promotion literature with which the prices were presented was accepted without independent checking. This promotion literature cited "typical" examples, all of which showed savings by use of the new prices. In some cases individual items were higher priced and in others they were lower priced but the net result was a savings.

None Lower—However, we have examined some of our recent orders and in particular, one large order which we placed under the old pricing system and not a single item was lower priced. There were 30 or 40 different items on this order.

Furthermore, two of our suppliers have indicated that they have analyzed their business over a period of a few months and find that applications of the new prices would result in a 5 to 7 pct increase in their billings. Since the avowed purpose of the price change is to make the handling of all items profitable, it does not seem fair to present this change as a general cost reduction. We certainly would be interested to know the reaction of other users as well as ourselves. —G. B. Wing, Assistant to the President, Nolan Corp., Rome, N. Y.

Organization Men

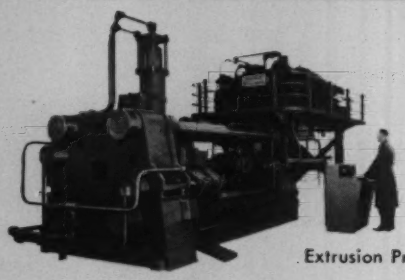
Sir—May we have permission to reproduce the article entitled "Are Organization Men Wanted?" which appeared in the February 18 issue of The IRON AGE?

It would be distributed within the company to training and development staff members and used for discussion in management development activities. Appropriate credit would be given The IRON AGE.—H. Sonthoff, Manager of Personnel Development, Raytheon Co., Commercial Apparatus and Systems Div., Watertown, Mass.

Permission granted.—Ed.

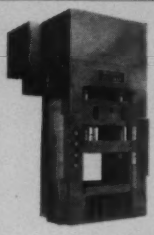
SPEED-BAND®
Capewell's new concept in band saw blades is setting new production records
ON ALL KINDS OF JOBS
ON ALL KINDS OF MATERIALS
ON ALL KINDS OF MACHINES
Ask your Capewell Distributor for the complete story.
Available only from Capewell Distributors
INDUSTRIAL DISTRIBUTORS
THE RIGHT HAND OF PRODUCTION
CAPEWELL
THE CAPEWELL MFG. CO.
HARTFORD 2, CONN.

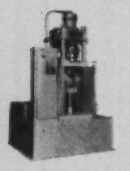
7 WAYS...



Extrusion Presses

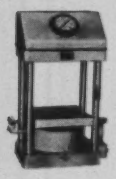
Metalworking Presses



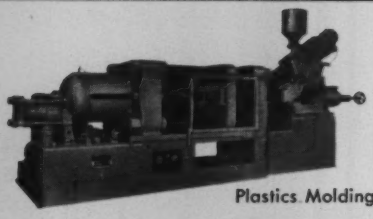


Powdered Metal Presses

Accumulators



Laboratory Presses



Plastics Molding Machinery

New 24-page bulletin 110-E tells what is available in this complete line of hydraulic equipment. Write for a copy today.

Bending Presses

Watson-Stillman can meet your hydraulic equipment needs

As these 7 different types of machinery suggest, it is easy to meet your hydraulic equipment needs when you come to Watson-Stillman. For here is a standard line that is as broad as your requirements. And you are assured of high quality, since these designs are based on 100 years of manufacturing experience.

One of these machines may be just what you want. But, perhaps your requirements are so unusual as to call for development of "a special," which has long been an important part of Watson-Stillman's service to industry.

Company engineers have helped thousands of manufacturers to find the right equipment for a specific job . . . in boosting production speed and efficiency. They are ready to go to work on your problem, too—from press design to installation.

FARREL-BIRMINGHAM COMPANY, INC.
WATSON-STILLMAN PRESS DIVISION
570 Blossom Road, Rochester 10, N. Y. *Telephone:* BUtler 8-4600
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.

FARREL
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WS-73

COMING EXHIBITS

Tool Show—April 21-28, Detroit Artillery Armory, Detroit. (American Society of Tool Engineers, 10700 Puritan, Detroit 38.)

Powder Metallurgy Show — April 25-27, Drake Hotel, Chicago. (Metal Powder Industries Federation, 60 E. 42nd St., New York.)

Welding Show—April 25-29, Great Western Exhibit Center, Los Angeles. (American Welding Society, Inc., 33 West 39th St., New York 18.)

1960 Castings Congress & Exposition—May 9-13, Convention Hall, Philadelphia. (American Foundrymen's Society, Golf & Wolf Rds., Des Plaines, Ill.)

Southwestern Metal Show — May 9-13, State Fair Park, Automobile Bldg., Dallas, Texas. (American Society for Metals, Metals Park, Novelty, O.)

Design Engineering Show — May 23-26, Coliseum, New York. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Production Engineering Show—Sept. 6-16, Navy Pier, Chicago. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

Machine Tool Exposition—Sept. 6-16, International Amphitheatre, Chicago. (National Machine Tool Builders Assn., 2139 Wisconsin Ave., Washington 7, D. C.)

Iron & Steel Show—Sept. 27-30, Cleveland Public Auditorium, Cleveland, O. (Association of Iron & Steel Engineers, 1010 Empire Bldg., Pittsburgh 22.)

MEETINGS

MARCH

Society for Non-Destructive Testing —Third international conference, March 15-21, Tokyo, Japan. Society headquarters, 1109 Hinman St., Evanston, Ill.

Scale Mfrs. Assn., Inc. — Spring meeting, March 22-23, Washington. Association headquarters, One Thomas Circle, Washington.

Pressed Metal Institute — Spring technical meeting, March 23-25, The Pick-Carter Hotel, Cleveland. Institute headquarters, 3673 Lee Rd., Cleveland.

Scientific Apparatus Makers Assn. —Annual meeting, March 27-31, Boca Raton Hotel & Club, Boca Raton, Fla. Association headquarters, 20 N. Wacker Dr., Chicago.

Assn. of Lift Truck & Portable Elevator Mfrs. — Spring membership meeting, March 28, Pittsburgh-Hilton, Pittsburgh. Association headquarters, One Gateway Center, Pittsburgh.

The Material Handling Institute, Inc.—Spring meeting, March 28-29, Pittsburgh-Hilton, Pittsburgh. Institute headquarters, One Gateway Center, Pittsburgh.

The Industrial Truck Assn.—Spring meeting, March 28-30, Pittsburgh-Hilton, Pittsburgh. Association headquarters, One Gateway Center, Pittsburgh.

Monorail Mfrs. Assn. — Spring meeting, March 28-30, Pittsburgh-Hilton Hotel, Pittsburgh. Association headquarters, 71 West 35th St., New York.

Gas Appliance Mfrs. Assn., Inc.—Annual meeting, March 30-April 1, The Greenbrier, White Sulphur Springs, W. Va. Association headquarters, 60 E. 42nd St., New York.

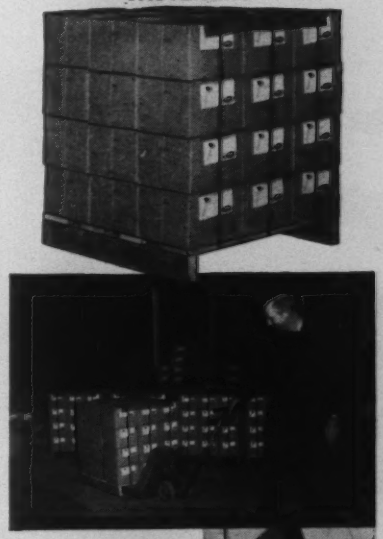
APRIL

The Metallurgical Society of AIME —Nuclear Congress, April 3-8, The Coliseum, New York. Society headquarters, 29 West 39th St., New York.

The Metallurgical Society of AIME —National Open Hearth Steel Conference & Blast Furnace, Coke Oven, & Raw Material Conference, April 4-6, Palmer House, Chicago. Society headquarters, 29 West 39th St., New York.

For The Best BULK PACKAGING

STANDARDIZE 100% ON **SOUTHERN** FASTENERS



Southern Screw's industry-acclaimed bulk packaging system will save you valuable handling time, regardless of whether your materials movement is mechanical, manual or power driven.

Heavy, 275# test 9" x 9" x 6½" cartons with telescopic top are securely bound with single wire which can be cut for quick, easy access to screws without damaging cartons. Thus tops and bottoms of cartons are usable on two production line stations; can be re-closed and re-used as often as desired.

Quality shipments are made in units of 36 cartons steel strapped to 30" x 30" two-way entry free pallet. Your shipment arrives ready for ceiling-high storage, or can be quickly disassembled for use at assembly line stations.

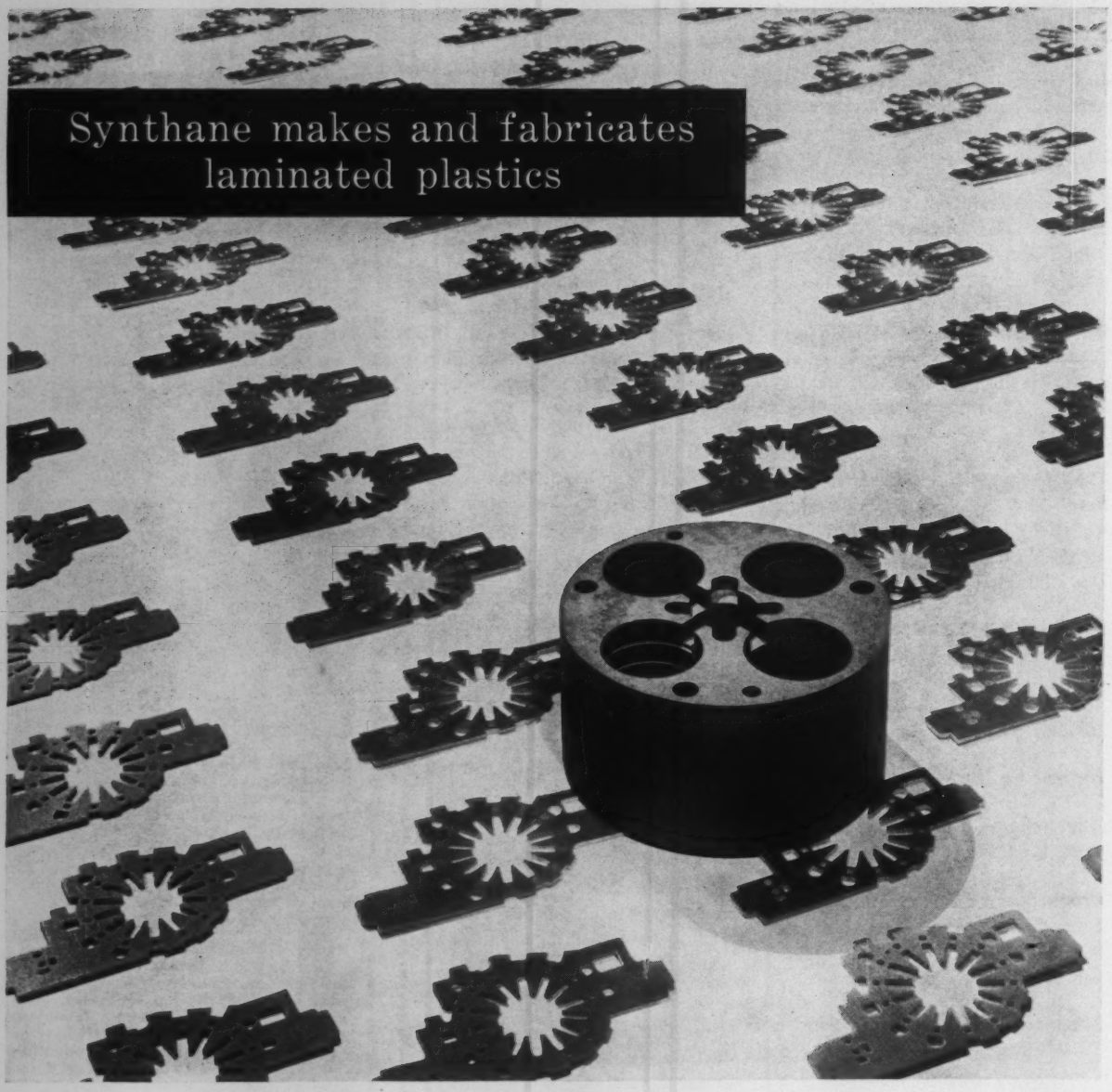
Write, asking for Chart BP-2, telling about standard quantities for each size of machine screws and tapping screws. Address Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock in Statesville, North Carolina

Warehouses: New York • Chicago • Dallas • Los Angeles

Machine Screws & Nuts • Tapping Screws • Wood Screws • Stove Bolts • Drive Screws Continuous Threaded Studs • Carriage Bolts

Southern SCREW COMPANY STATESVILLE • NORTH CAROLINA



We'll make ONE or ONE MILLION for you

Regardless of the nature of the piece or of the quantity, it is usually good business to let us fabricate your laminated plastics part or parts.

We have the material in stock or can make it quickly, including any modifications necessary to improve it for your purpose. You save time. You have no decisions to make on tolerances, dimensional allowances, clearances on tools, or speeds and feeds to use. Spoilage is not your concern.

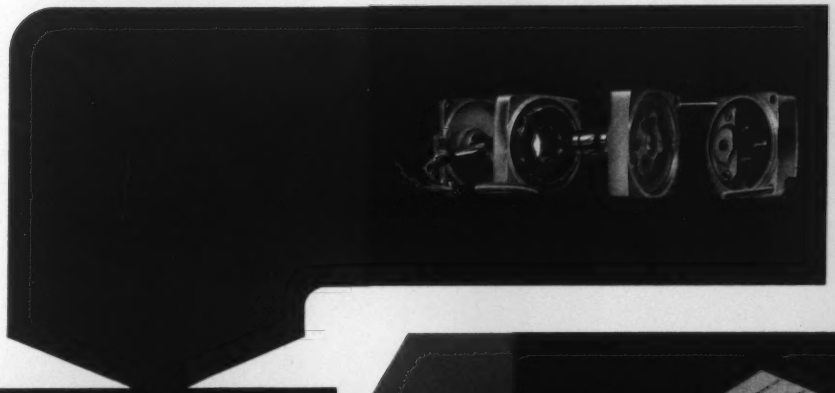
Since we make our own special tools, dies or jigs, they are our design problems, not yours. It may be possible to save money by molded-laminated or molded-macerated procedures. We'll tell you.

All you have to do is pay the bill. And this is painless because special tools and skills keep it low. Call your Synthane representative — in any principal city—for a quotation or write Synthane Corp., 56 River Road, Oaks, Pa.

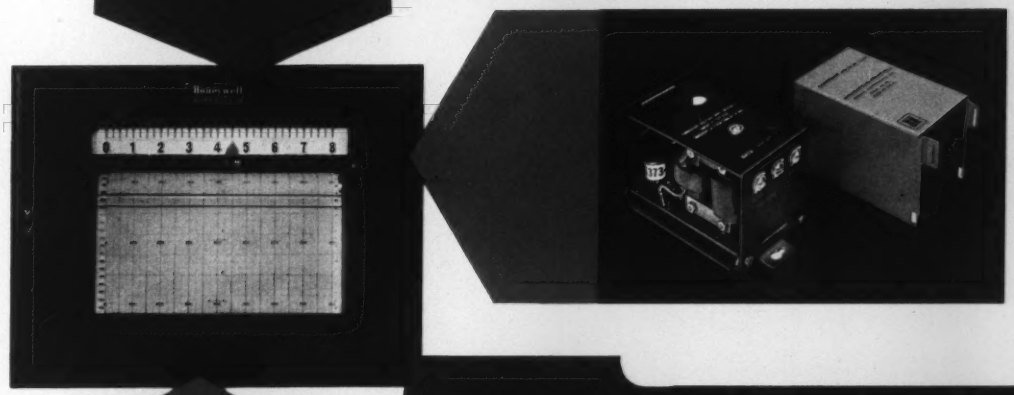
You furnish the print—we'll furnish the part

SYNTHANE
CORPORATION OAKS, PENNA.
Sheets • Rods • Tubes • Fabricated Parts
Molded-laminated • Molded-macerated

MODULAR DESIGN MAKES 1960 *Electronik* POTENTIOMETERS A GREATER VALUE THAN EVER

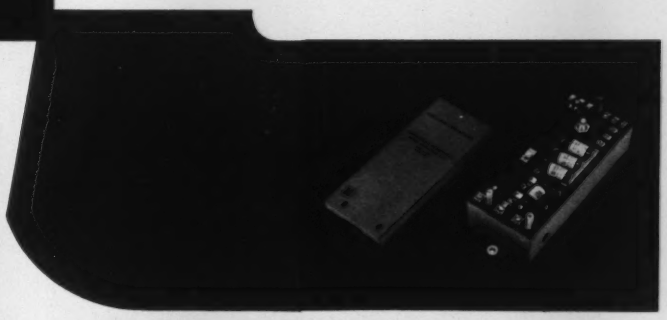


BALANCING AND CHART DRIVE MOTORS are sectionalized. Service is simplified because any major part can be replaced in a matter of seconds.

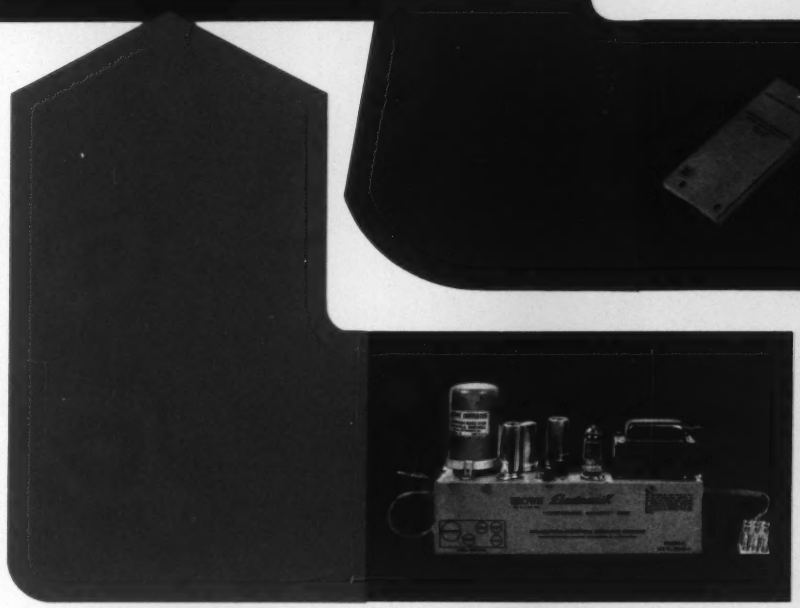


CONSTANT VOLTAGE UNIT* eliminates need for batteries, standard cells, and standardizing mechanisms . . . insuring long life.

*Zener Diode

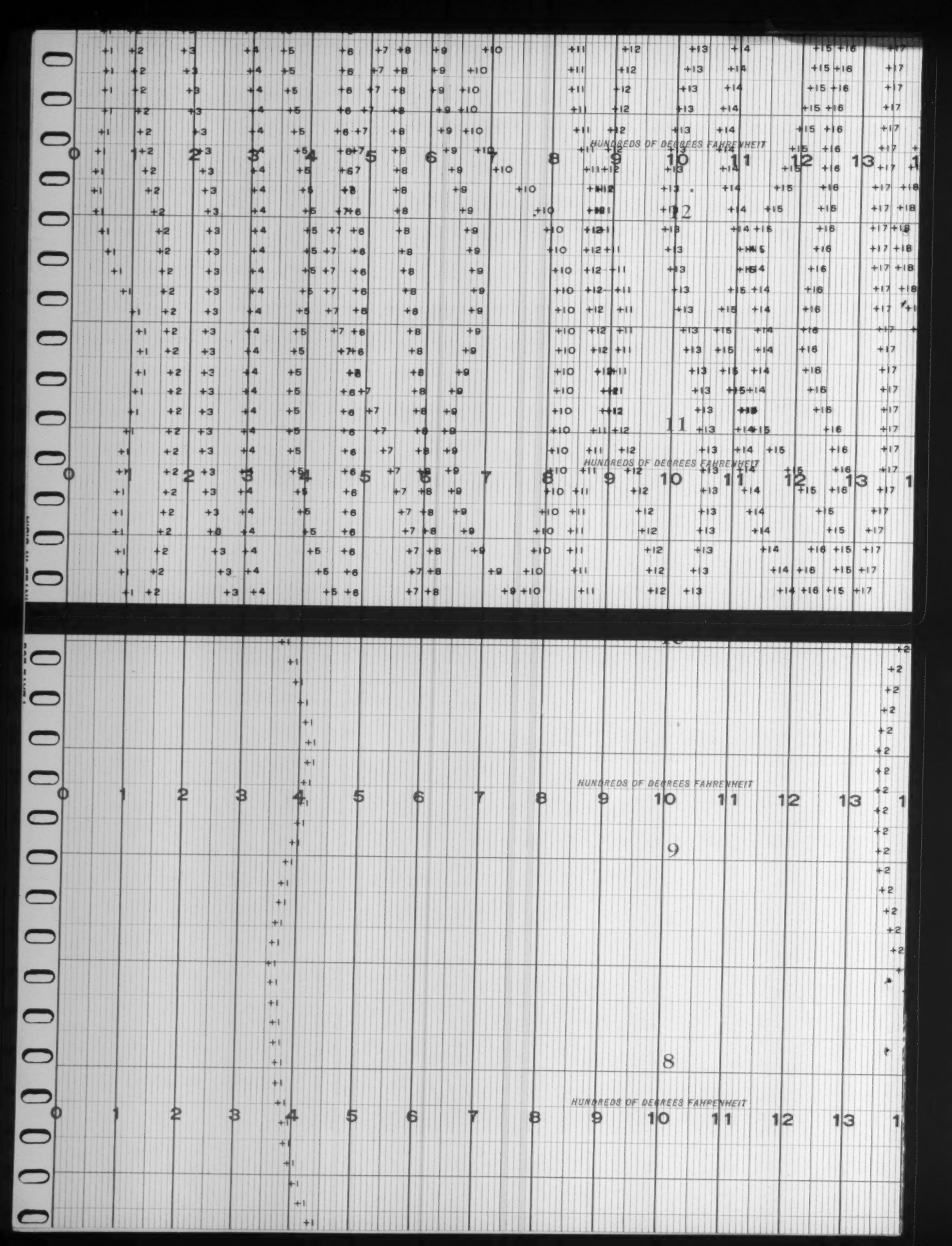


COMPARTMENTED MEASURING CIRCUIT UNIT makes range changing easy. Change one screw on a clip connected card of fixed resistors, and the job is done in a matter of seconds.



QUICK-CONNECT AMPLIFIER is easily removed from the instrument by means of a polarized plug.

BUT THIS IS JUST PART OF THE STORY OF THE 1960 LINE OF ELECTRONIK POTENTIOMETERS. LOOK AT THE DRASTIC CHANGES IN THE ELECTRONIK MULTI-RECORD RECORDERS.


HUNDREDS OF DEGREES FAHRENHEIT
0 1 2 3 4 5 6 7 8 9 10 11 12 13
HUNDREDS OF DEGREES FAHRENHEIT
0 1 2 3 4 5 6 7 8 9 10 11 12 13
HUNDREDS OF DEGREES FAHRENHEIT
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HUNDREDS OF DEGREES FAHRENHEIT
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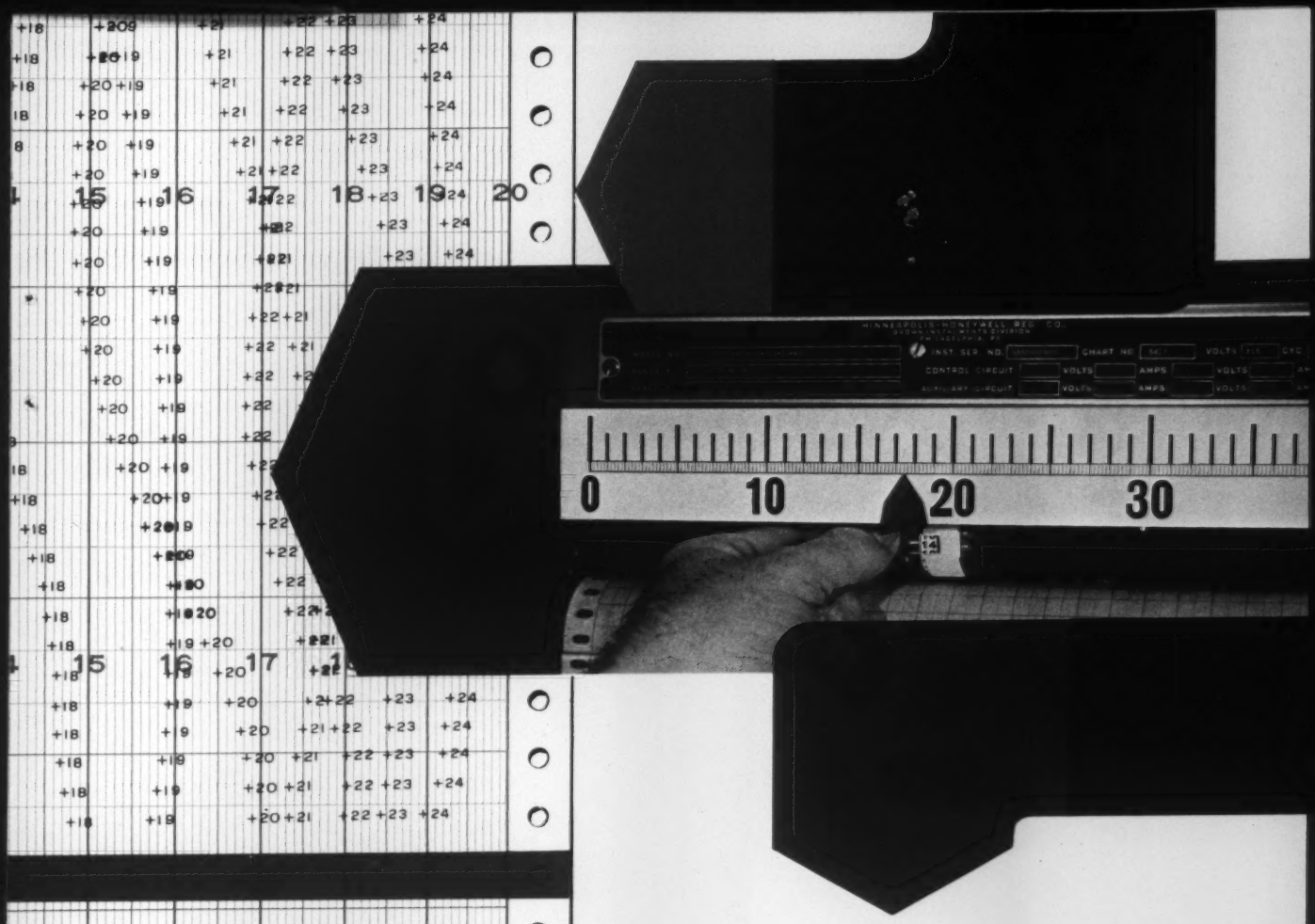


Record 2 to 24 points on one instrument with new UNIVERSAL *ElectroniK*

MULTI-RECORD INSTRUMENT

Now, you can record 2,3,4,6,8,10,12,16,20, or 24 points on one ElectroniK Multi-Record Instrument . . . and change the number of points to be recorded in a matter of seconds. It's easy as this: remove a thumb-tight nut and slip off old print wheel . . . and indicator dial. Slip on a new wheel and dial: Replace nut. Plug in the number of points desired, and the job is done.

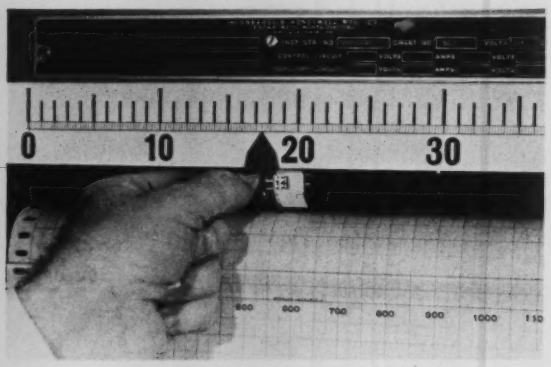
The universal features and modular design of the 1960 line of ElectroniK potentiometers are standard on all multi-record non-control models. Range and compensation changes are quick and easy, too . . . just change the cards.

FROM HONEYWELL... A DIAMOND JUBILEE PARADE OF PRODUCTS

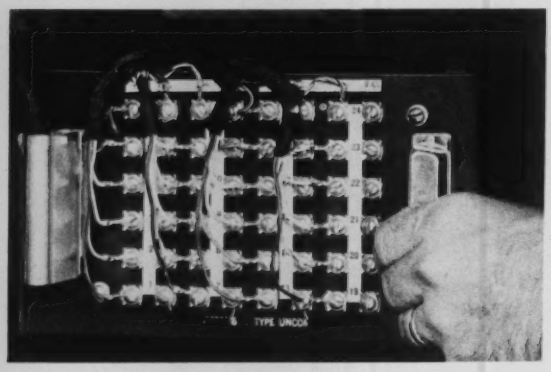
SEE HOW EASY THE 1960 ELECTRONIK MULTI-POINT RECORDERS ARE TO USE...

all it takes with the 1960 *ElectroniK* MULTI-RECORD RECORDERS to change . . .

. . . number of points recorded



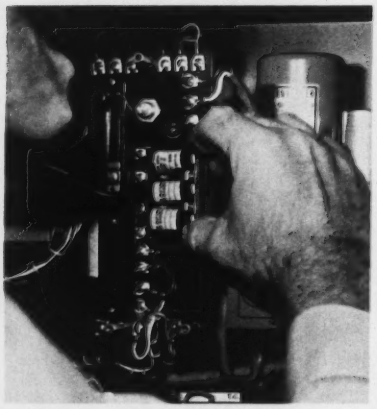
First: remove thumb-tight nut; slip off print wheel and indicator dial. Slip on new wheel and dial and replace nut.

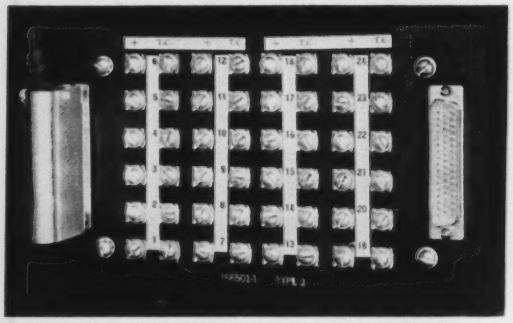


Second: replace one plug-in unit and the instrument is ready to record a different number of points.

The new flexibility and convenience of the 1960 ElectroniK Multi-Record Recorders should interest you. This new design has resulted in substantial manufacturing cost reductions which are reflected in our new price structure. Your nearby Honeywell field engineer has the full details. He's as near as your telephone. Minneapolis-Honeywell, Wayne and Windrim Avenues, Philadelphia 44, Pa.

. . . RANGE—Loosen screws and slide out the range resistor card. Replace with a different card, tighten screws and the job is done quickly and easily.





. . . COMPENSATION—The input terminal board with built-in reference junction comes out by removing one plug. Slide in the new board, replace the screws and plug and the compensation is changed.

Honeywell

First in Control

SINCE 1885

75th YEAR

PIONEERING THE FUTURE

Lower your per unit stamping cost with

AUTOMATIC PRODUCTION

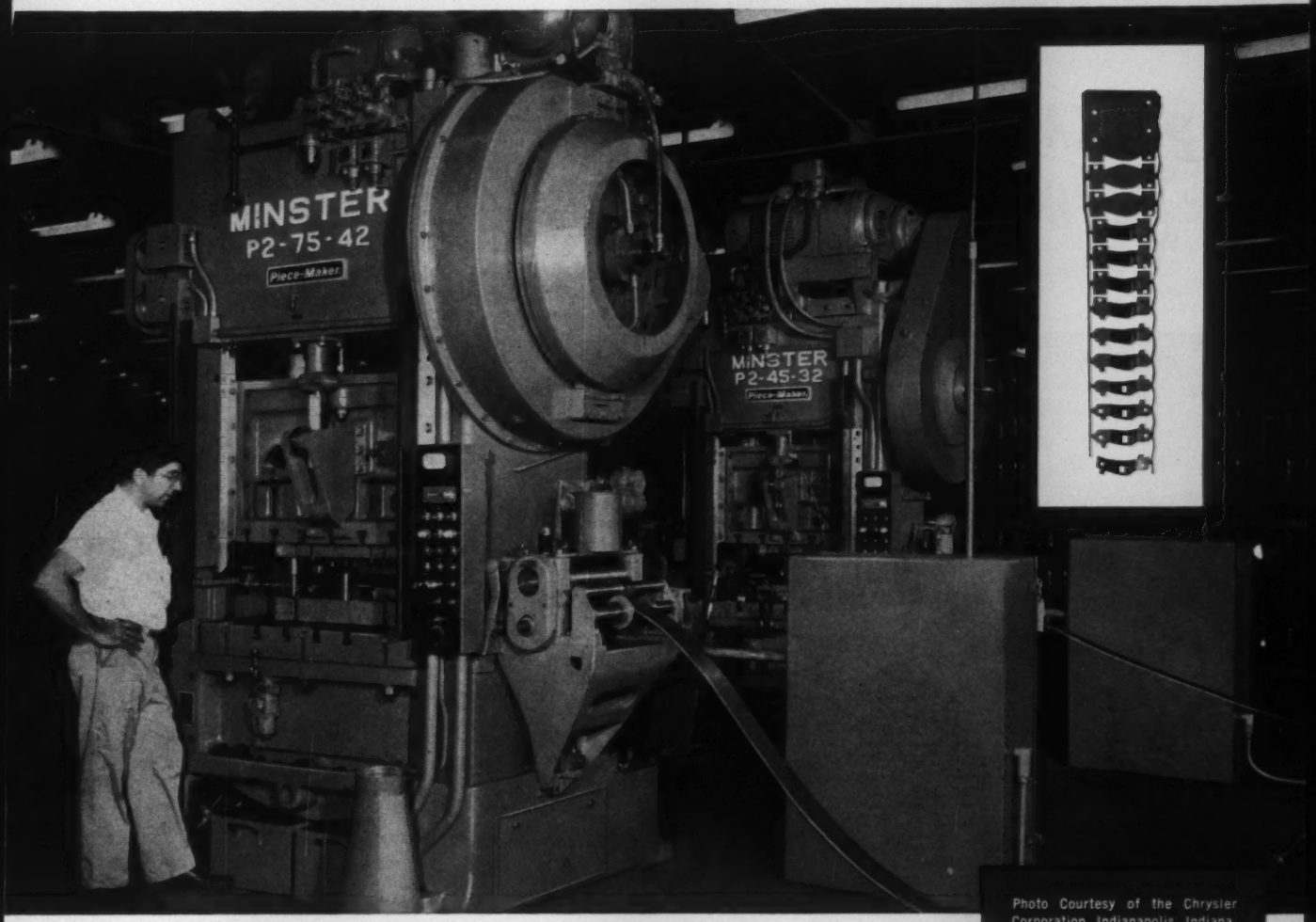


Photo Courtesy of the Chrysler Corporation, Indianapolis, Indiana.

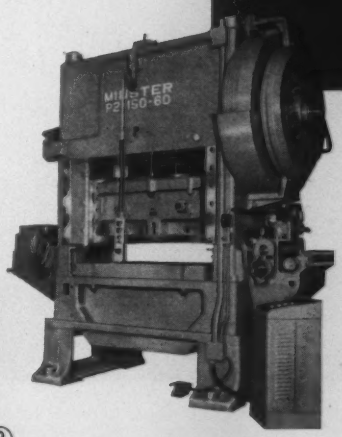
Minster Piece-Maker automatic production presses are designed for rigidity and built with precision. From 20 to 300 ton capacity.

Minster *Piece-Maker*® Presses

You get more parts per hour at a lower unit cost when you produce stampings automatically. Costs shrink as you eliminate expensive rehandling and storage of parts between operations.

Minster offers a complete range of press types and sizes for all kinds of profitable automatic production . . . long runs, short runs, big parts or tiny parts.

The right Minster press, with feed equipment matched to both press and job, can lower your unit costs, give you maximum productivity. Want more facts? Write or call us today.



The Minster Machine Company • Minster, Ohio

MINSTER®

CF&I Heavyweight Shaped Coils

PACKAGED for YOUR PRODUCTION

Mr. Marwil points out in-plant handling and unloading is more efficient and economical with CF&I Shaped Coils than with mill coils. Shaped coils can also be stored more compactly.

give long production runs at Marwil Products Co.

With a 12 million unit annual capacity, Marwil Products Co., Fort Loramie, Ohio, is rated as the largest U. S. manufacturer of muffler clamps and U-bolts. Nine months ago the company switched to CF&I Wire. Mr. William Marwil, Vice President tells why:

"We find CF&I's 2000 lb. shaped coils of clean, bright basic wire are very uniform, with no 'thin' areas or rough finish. These large coils give us longer runs without the necessity for frequent set-ups on our Lewis Cut Off machines."

In addition to the high quality of CF&I Wire, new packaging methods have increased the preference for CF&I Wire.

Replacing small, light-weight coils are CF&I Shaped Coils and spiders. The spider, leased from CF&I, acts like a spool, and pays off the wire evenly and smoothly. Now, instead of losing hours of production time every day in changing small coils or unravelling tangled wire, *one* CF&I Shaped Coil can usually last many hours. The shaped coils and spiders make for easier handling and storage, too.

One of our salesmen will be glad to recommend the right "package" to increase your production and cut manufacturing costs. You can call your nearest CF&I sales office today and arrange a "no obligation" visit.

CF&I-WICKWIRE WIRE

THE COLORADO FUEL AND IRON CORPORATION

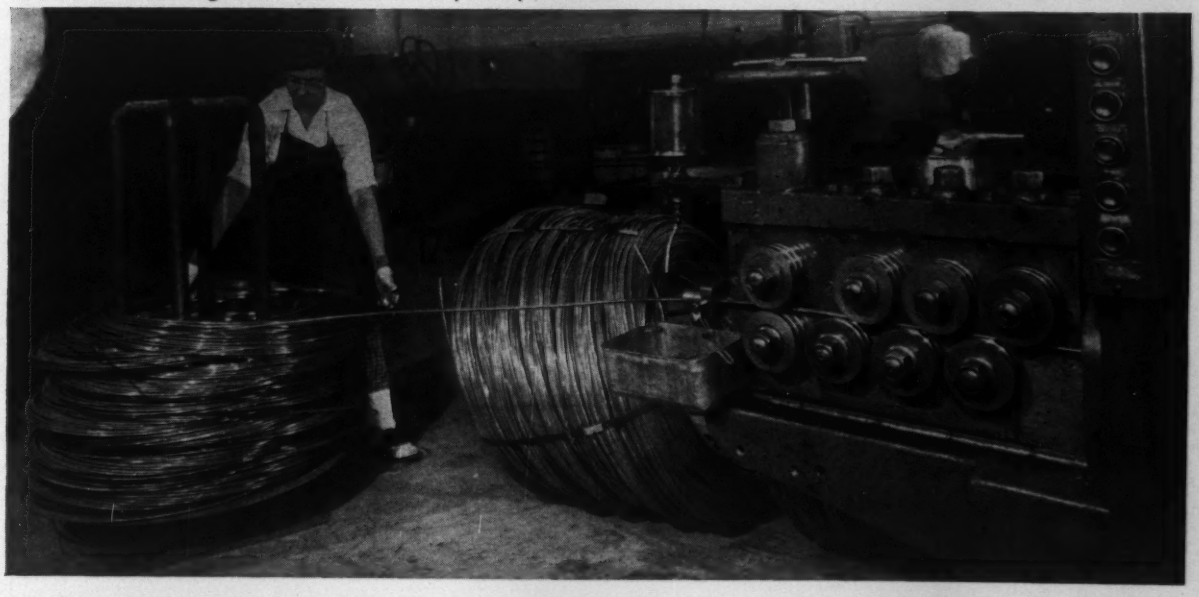
7348

In the West: **THE COLORADO FUEL AND IRON CORPORATION**—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Farmington (N. M.) Ft. Worth • Houston • Kansas City • Lincoln • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco San Leandro • Seattle • Spokane • Wichita

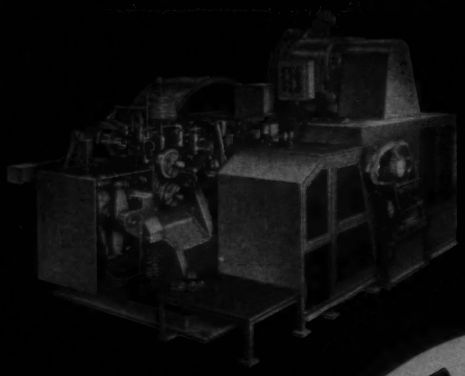
In the East: **WICKWIRE SPENCER STEEL DIVISION**—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

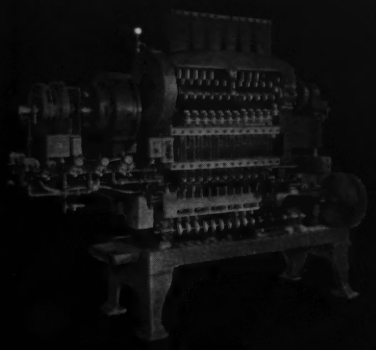
CF&I OFFICE IN CANADA: Montreal • **CANADIAN REPRESENTATIVES AT:** Calgary • Edmonton • Vancouver • Winnipeg

CF&I Wire being fed into the Lewis Cut Off machine. This machine cuts wire into 5" to 20" lengths at a rate of about 150 pieces per minute.



COLD HEADING
MACHINERY

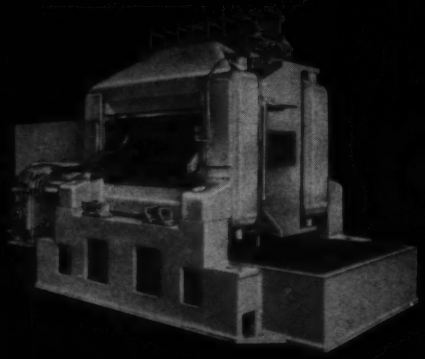


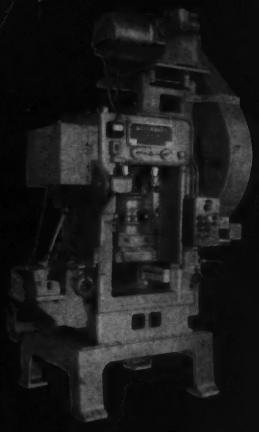


EYELET, SLITTER
& WIRE
MACHINERY

WATERBURY FARREL
MACHINERY BUILDERS

ROLLING MILL
MACHINERY





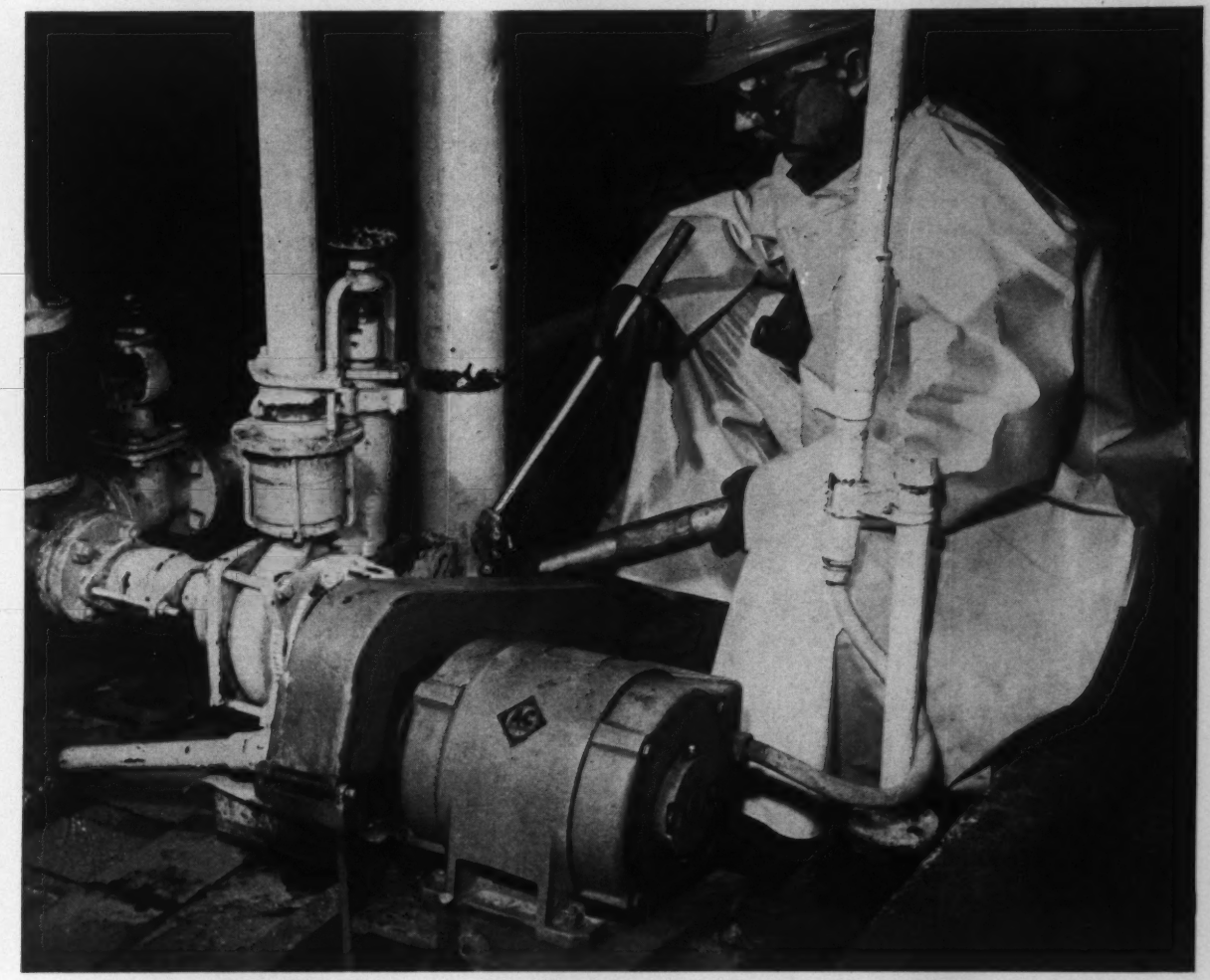
POWER
PRESSES

THE WATERBURY FARREL FOUNDRY & MACHINE CO.
DIVISION OF TEXTRON INC
Waterbury, Connecticut, U.S.A.
Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

WF 53

ALLIS-CHALMERS

A-1235



ACID AREA APPLICATION. Safety equipment and clothing are a "must" for personnel in the acid atmosphere of Dow's chlorine plant at Freeport, Texas. This **Super-Seal** motor came prepared, too — with **Poxeal** insulation guarding the stator.

Nothing...but nothing...stops Super-Seal motors

In a tough acid pump installation, Dow Chemical's Texas Division experienced no end of motor troubles. It seemed nothing could stand up in that humid, corrosive atmosphere. Reports Dow: "Even with totally enclosed motors, winding failures were frequent." And, they might have added, expensive.

Then came *Super-Seal* motors— with amazing *Poxeal* insulation. A durable case of epoxy-resin encloses the winding end turns and slot portions of the stator . . . the most complete protection ever developed. Result? The *Super-Seal* motor, *after two years* of continuous operation in the acid area, is as good as ever. So good, in fact, that Dow has ordered 150 *Super-Seal* motors for a new chemical plant at Freeport, Texas.

Isn't it time to revaluate *your* motor standards? There's a good chance that *Super-Seal* motors can solve your motor problems, too. Contact your A-C representative or distributor, or write **Allis-Chalmers,** General Products Division, Milwaukee 1, Wisconsin.

Super-Seal and Poxeal are Allis-Chalmers trademarks.

Failure of any part of a missile—be it the mighty Atlas, Jupiter or Thor—can mean failure of the mission. That's why the complex connections in the ducting systems of these and other missiles are silver brazed. These connections must stand up under 6,000 psi; they are tested to 12,000 psi.

In lines made to specifications by Flexonics Corporation, Maywood, Illinois, silver brazing joins a corrugated flexible pressure carrier, a braid sleeve and a coupling nipple—all of stainless steel; it permits joining all of these elements of the assembly without danger of annealing the pressure-carrying flex or the restraining braid as welding might do.

Assemblies designed for 6,000 psi operating pressure are required to withstand a 12,000 psi test and take four times their normal operating pressure before failure. They may also be required to pass a flame test in order to meet specifications.

The silver-brazed connections are used on hydraulic and pneumatic systems, fuel drain lines and vent tubes. Some of these applications involve rigorous service with extreme pressure shocks accompanied by sudden elevations of temperature, which may go from −60° to 400-600° F in a matter of seconds.

A more "high level" endorsement of Handy & Harman silver alloy brazing is not available. On the ground or in the air, the qualities of this remarkable metal joining method apply; strength, ease of production, cost, gas and liquid joint tightness to name a few. The entire brazing story is yours merely for the asking. Inquiries and metals-joining "problem exposure" may be addressed to Handy & Harman, 82 Fulton Street, New York 38, N. Y. We welcome the opportunity to work with you.

Your NO. 1 Source of Supply and Authority on Brazing Alloys

HANDY & HARMAN

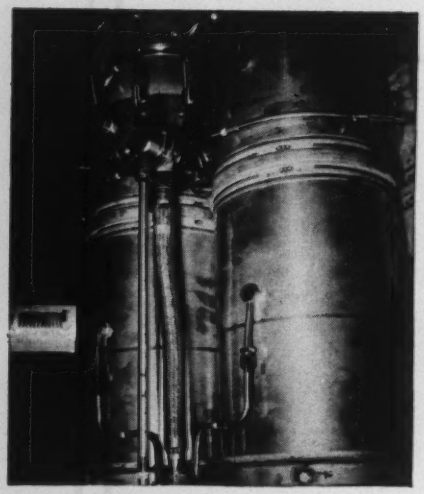
General Offices: 82 Fulton St., New York 38, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES

No Margin Here for joint failure!

Assemblies in ATLAS Missile **HANDY & HARMAN** Silver Brazed

Intercontinental Atlas missile being made ready for launching.



Close-ups of missile section, showing silver alloy brazed ducting assembly.

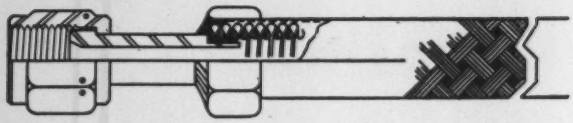
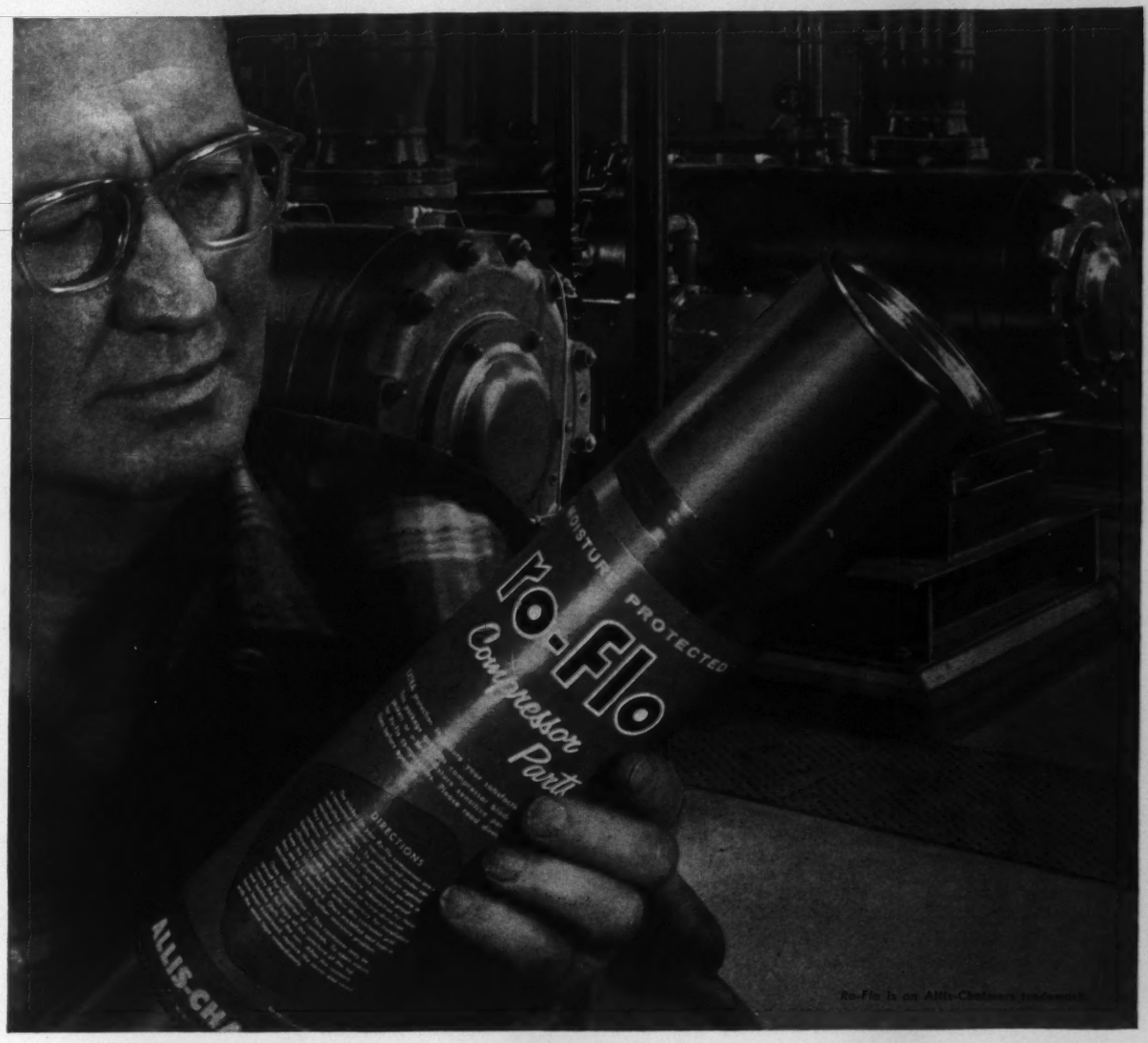


Diagram of pressure carrier.

FOR A GOOD START: BULLETIN 20.

This informative booklet gives a good picture of silver brazing and its benefits...includes details on alloys, heating methods, joint design and production techniques. Write for your copy.

ALLIS-CHALMERS



Imagine! A package this small

contains the spare parts for your Ro-Flo compressor

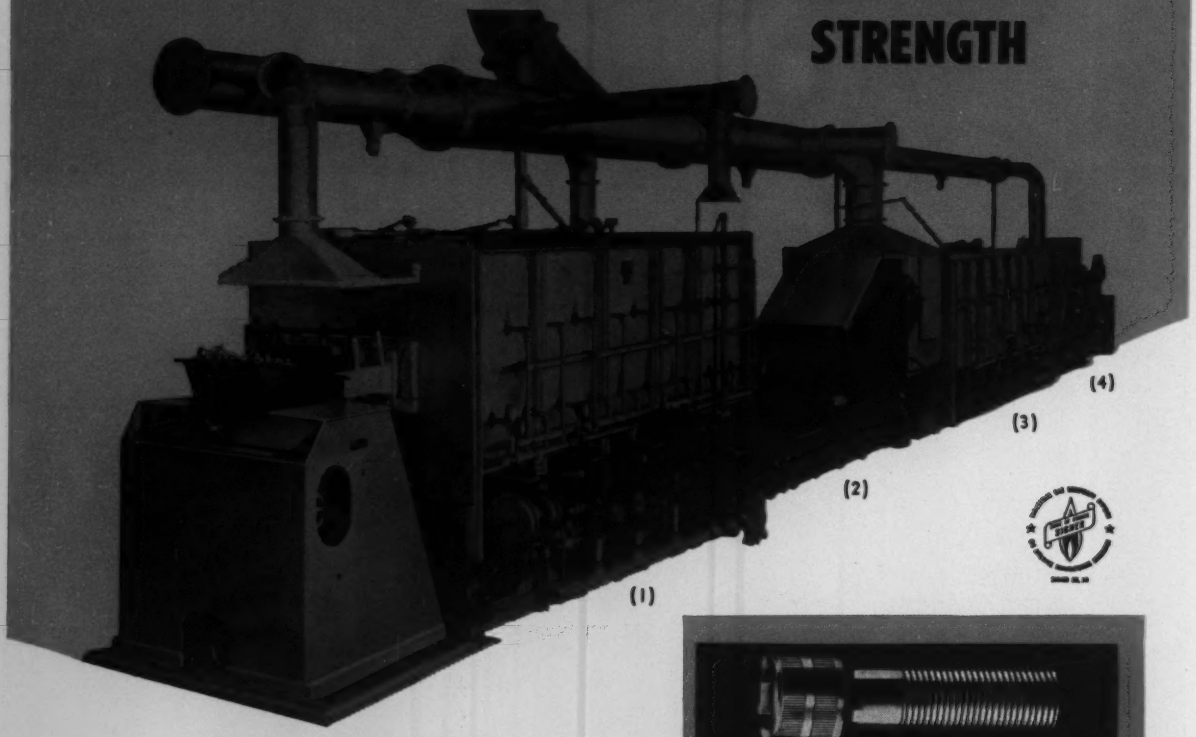
A spare parts kit you can hold in your hand — dramatic evidence of the continuous, trouble-free performance that is yours with a *Ro-Flo* compressor.

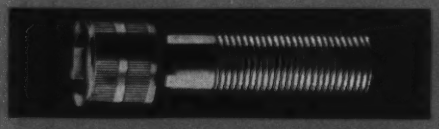
You need fewer spare parts because there are fewer moving parts to wear out. No pistons, no valves, no connecting rods. Besides the bearings and seals, which all units have, only the rotor blades are exposed to normal wear, and rotary design compensates for it — automatically, by centrifugal force. Average blade life is two to three years, and when finally worn, blades can be replaced in one simple operation.

Smooth rotary motion of the *Ro-Flo* compressor eliminates the vibration and pounding shock of reciprocating units — and the necessity for expensive, heavy foundations. A slab is enough. Smaller units can be mounted directly to the floor.

Two-stage *Ro-Flo* compressors are built in twelve sizes to handle from 250 to 1800 cfm at pressures from 60 to 125 psig. Single-stage units up to 50 psig, from 40 to 3000 cfm. *Ask your A-C representative for descriptive literature, or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wisconsin.* A-1270

AGF HEAT TREATING PRODUCTION LINE AT HOLO-KROME INSURES UNIFORM TENSILE STRENGTH





HOLO-KROME features socket screw products having toughness as well as uniformity of hardness and strength. AGF Furnace equipment contributes to this high standard.

POSITIVE ASSURANCE that every Holo-Krome socket screw will have correct tensile strength and a uniform distinguishing color, characteristic of quality heat treating, is embodied in the above AGF installation.

This AUTOMATIC production line consists of:

(1) An AGF No. 240 Heating Machine which hardens the screws in a controlled atmosphere at the rate of 400 to 500 pounds per hour.

(2) An AGF Conveyorized Quenching Tank.

(3) An AGF No. 242 Heating Machine which tempers the work utilizing residual quenching oil remaining on the work pieces to produce an attractive black finish, which then discharges into

(4) an AGF Conveyorized Quench Tank equipped with a vibrator discharge chute for removing the oil and carrying the work to the packaging operation.

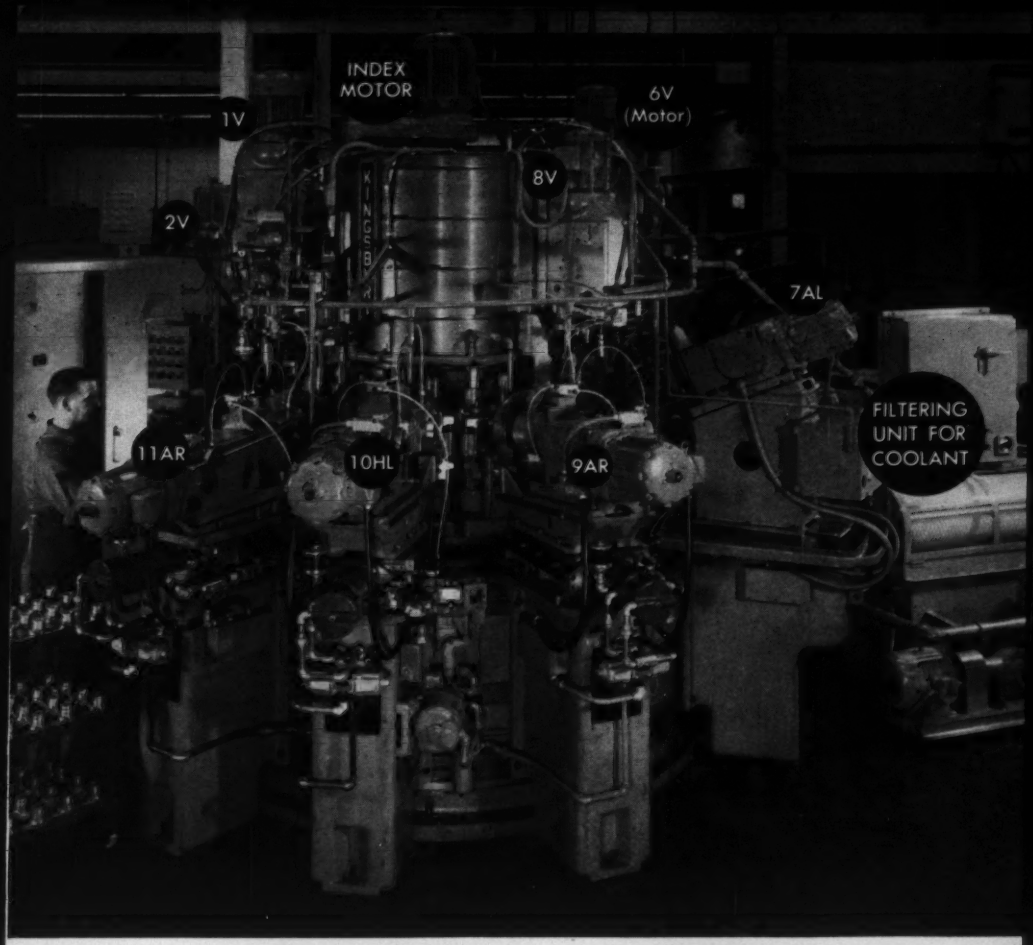
Your heat treating of fasteners or other small parts like stampings, screw machine products and precision castings can be accomplished with greater uniformity and quality control and at lower cost in AGF equipment.

PIONEER Furnace Engineers and experienced metallurgists at AGF will weigh your needs and make a proper recommendation without obligation.

Write today for the name of nearest AGF factory trained representative located in major industrial areas.

AMERICAN GAS FURNACE CO.

1004 LAFAYETTE STREET — ELIZABETH 4, N. J.



12 OPERATIONS ON GOVERNOR BODY

1V Vertical
Step drill valve hole through

2V Vertical
Mill face 7200 rpm fine finish

3H Horizontal hidden
Rough bore large hole

4AL Angular left, hidden
Drill angular oil hole

5H Horizontal, hidden
Drill flash in 4 holes

6V Vertical
Step gun ream part of valve hole

7 HR Horizontal right, hidden
Drill angular oil hole

7 AL Angular left
Drill angular oil hole

8V Vertical
Step gun ream part of valve hole

9AR Angular right
Mill first oil pocket

10HL Horizontal left
Mill second oil pocket

11AR Angular right
Mill third oil pocket

Kingsbury machine produces fine finish at high rate, performs variety of operations

Easy change-over for work on similar part

In one chucking of the work twelve units on this Kingsbury perform all of the operations shown. With a 19-second time cycle for the operations and indexing, the gross production rate is 190 parts per hour.

SOME NOTEWORTHY FEATURES

Mill face. A motorized spindle produces a fine finish by running at high speed and then retracting from the work on the return stroke.

Mill oil pockets. Airdraulic slides position oscillating heads that feed the cutters sideways inside the hole.

Drill angular oil holes. Each unit is at an angle to the radial center line through its station. Two units are mounted on angular risers.

Five-step valve hole. Two units step gun ream with high speeds and fine feeds using filtered coolant under pressure.

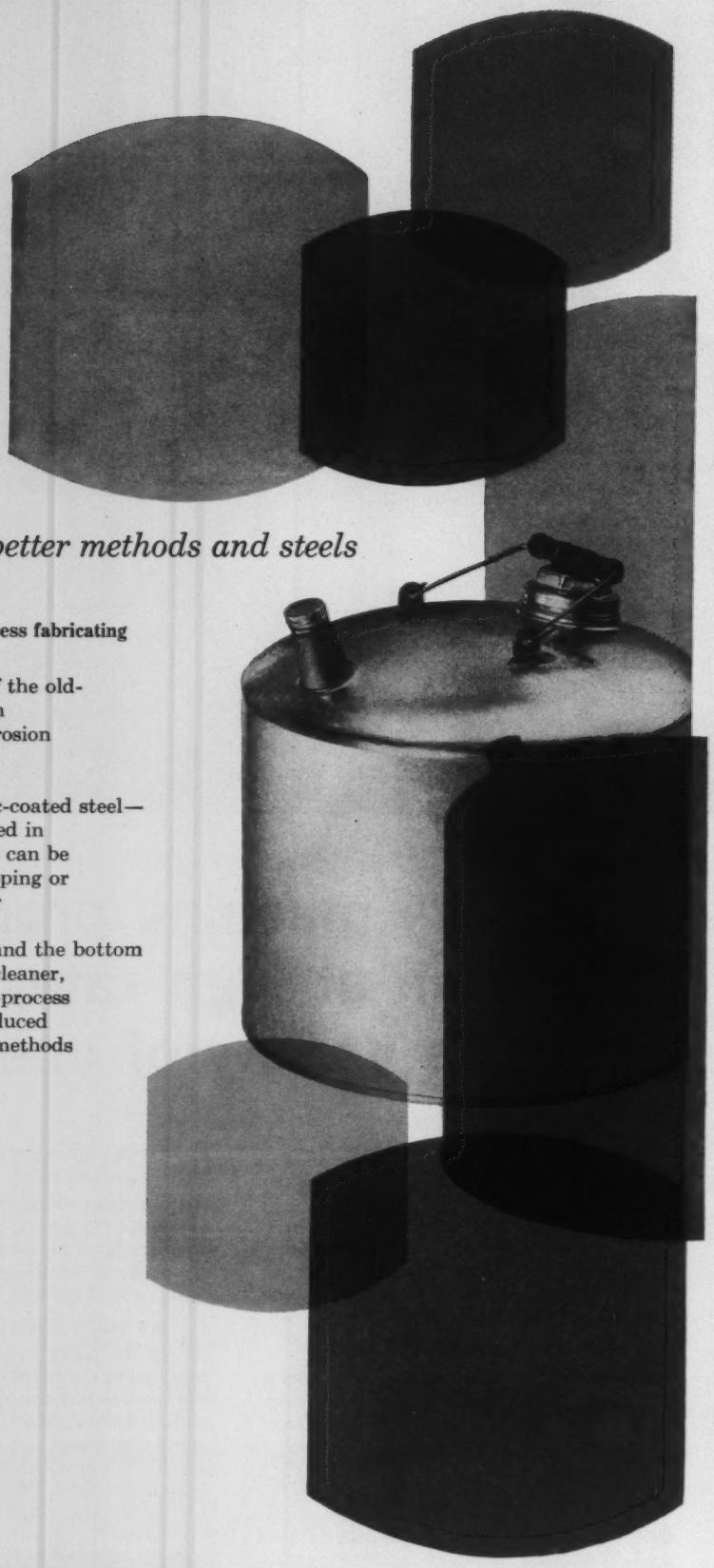
With a few changes this machine also operates on a similar part. A seven spindle auxiliary head can be mounted in two different positions to drill four holes in one part or three in the other.

WE BUILD SIMPLE MACHINES TOO

If you do drilling type operations in high production — simple or complex — we want to talk business. Our good basic design and accurate rugged construction pay off for you in minimum rejects and downtime. Kingsbury Machine Tool Corp., Keene, New Hampshire.

MMT-PE

KINGSBURY MULTI-UNIT AUTOMATICS



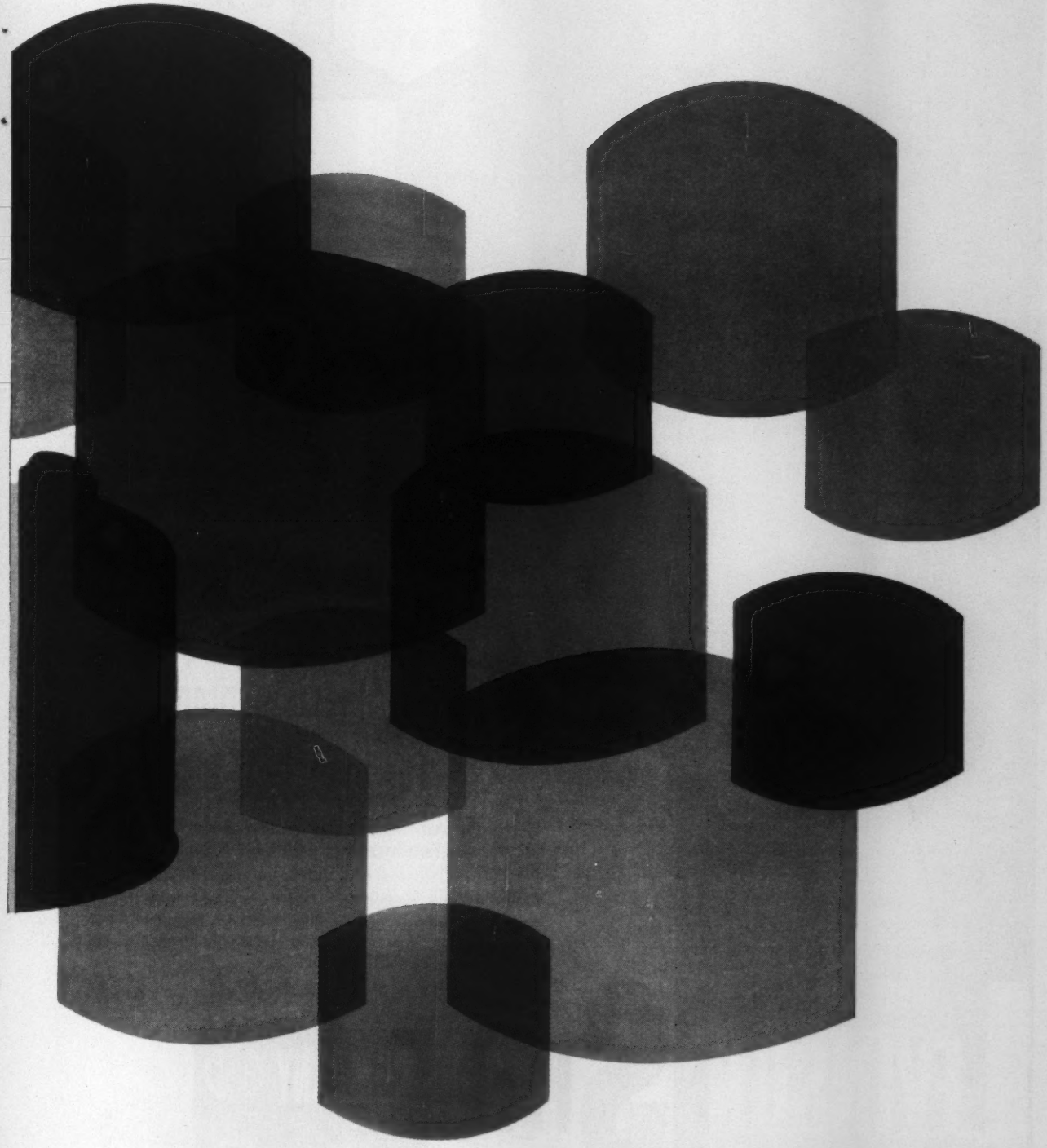
Better products through better methods and steels

How zinc-coated steels make faultless containers with less fabricating

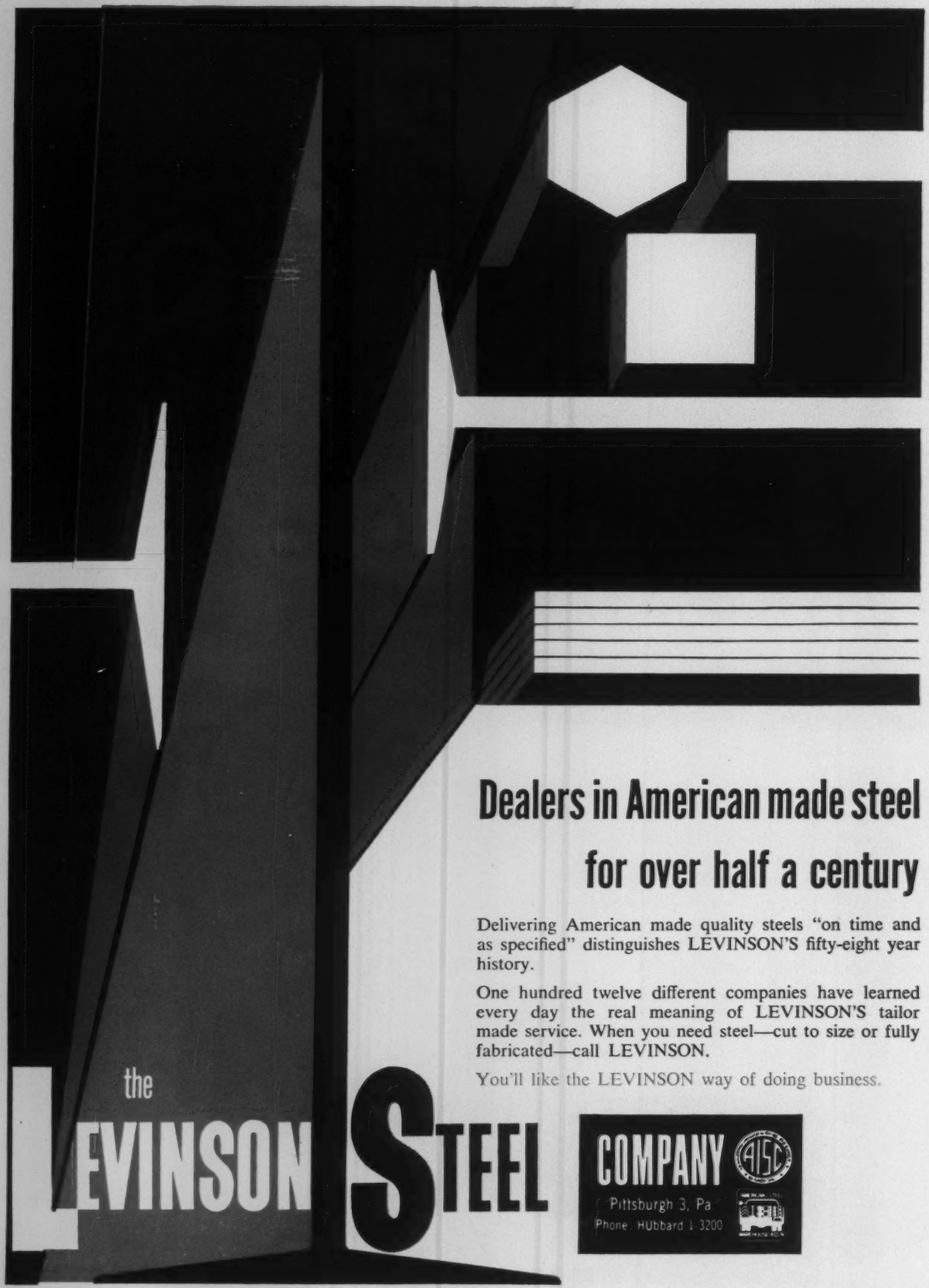
The container shown here is the modern version of the old-fashioned gasoline-oil can—formerly produced with lock or welded seams, then hot zinc dipped for corrosion protection. Its seams collected grease, dirt and moisture and it was susceptible to leakage.
Now—because of Weirkote continuous-process zinc-coated steel—it has a smooth, seamless dome-shaped body, formed in a tortuous three-draw operation. Because Weirkote can be worked to the limits of the steel itself without chipping or flaking, the zinc coating remains intact and further processing for corrosion resistance is unnecessary.
Because side and top seams have been eliminated and the bottom is double-seamed to the body, the container stays cleaner, lasts longer and is leak-proof. Weirkote continuous-process zinc-coated steel is but one of many fine steels produced by Weirton Steel Company—improving products, methods and profits throughout industry.

WEIRTON STEEL COMPANY

WEIRTON STEEL
Weirton, West Virginia



Weirton Steel is a division of **NATIONAL STEEL CORPORATION**



Dealers in American made steel for over half a century

Delivering American made quality steels "on time and as specified" distinguishes LEVINSON'S fifty-eight year history.

One hundred twelve different companies have learned every day the real meaning of LEVINSON'S tailor made service. When you need steel—cut to size or fully fabricated—call LEVINSON.

You'll like the LEVINSON way of doing business.

the LEVINSON STEEL COMPANY

Pittsburgh 3, Pa

Phone HUbbard 1-3200

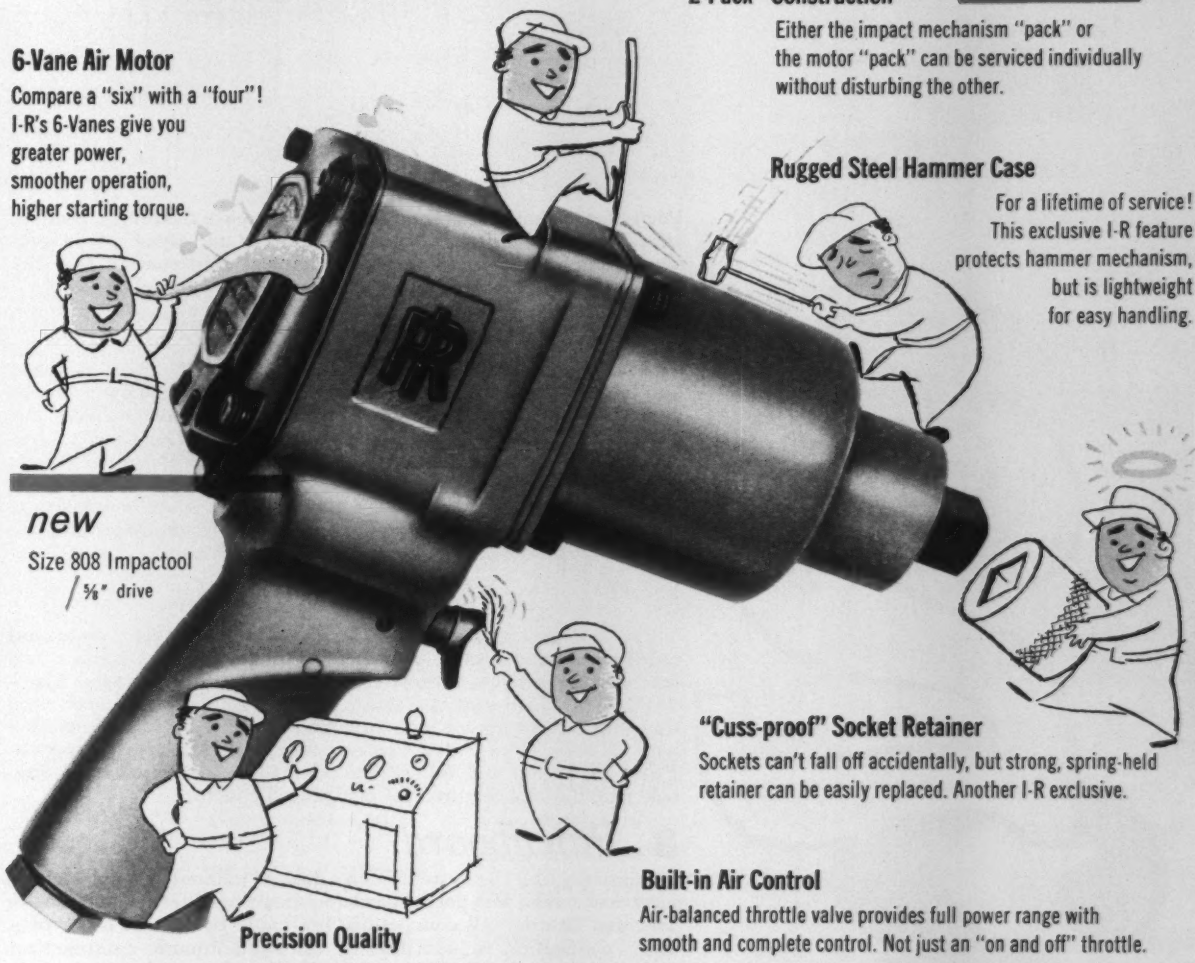
A NEW IMPACTOOL

...WITH EXTRAS THAT PAY OFF FOR SMART TOOL BUYERS!

6-Vane Air Motor
Compare a "six" with a "four"! I-R's 6-Vanes give you greater power, smoother operation, higher starting torque.

"2-Pack" Construction
Either the impact mechanism "pack" or the motor "pack" can be serviced individually without disturbing the other.

Rugged Steel Hammer Case
For a lifetime of service! This exclusive I-R feature protects hammer mechanism, but is lightweight for easy handling.



new
Size 808 Impactool
⅝" drive

"Cuss-proof" Socket Retainer
Sockets can't fall off accidentally, but strong, spring-held retainer can be easily replaced. Another I-R exclusive.

Built-in Air Control
Air-balanced throttle valve provides full power range with smooth and complete control. Not just an "on and off" throttle.

Precision Quality
Special electronic equipment double-checks machined parts for perfect mating of all surfaces and bores.

LOOK FOR I-R EXTRAS BEFORE YOU BUY!

Smart buyers and experienced tool men know these Ingersoll-Rand EXTRAS pay off . . . in terms of longer tool life, easier maintenance, and better nut running performance. With them you get 20% more power and 200% faster rundown in a precision tool so small (7½") and light (8⅞ lbs.) you can use it anywhere.

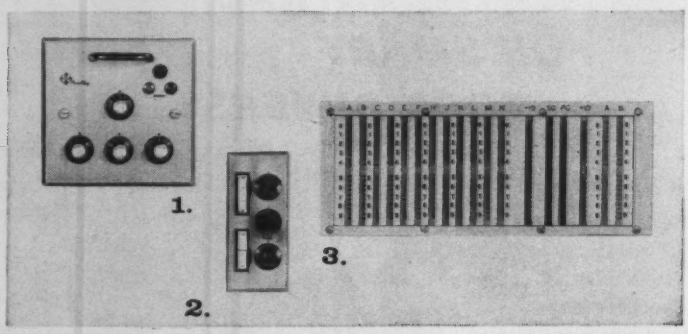
For details on the all-new Size 808 Impactool, call your I-R representative today. Or write: Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

34A-8

Ingersoll-Rand
Tools plus AIRengineering increase output per man

Hagan PowrMag Analog Computer Control

simple as



PowrMag systems embody the highest degree of flexibility. Simple, efficient electrical design utilizing long-lived and trouble-free solid state components, and rugged mechanical construction suit the system for a variety of industrial process control applications.

1. *Magnetic Control Unit*

This magnetic amplifier, operating on 1-9v DC, may be used individually, as a single 2 or 3 mode controller, or as one element in a large system. Each control unit may be removed from the front of the panel for easy interchangeability. The basic unit is easily converted to other modes by the addition of interchangeable, plug-in circuits for *all* common control operations. Inventory is reduced to the one basic unit. Unaffected by shock or vibration, PowrMag has no moisture, dirt, leakage or freezeup problems—3.5 watts of unregulated 110v, 60 cycle AC. Size—5¼" x 5¼".

2. *Remote Control Station*

These stations provide for remotely established set points and required manual control operations. Full station may contain two single or ganged potentiometers, one switch and two meters. Size—2¼" x 5¼". Half stations available with set point, bias or ratio dial and output signal indicator. Size—2¼" x 3⅛". Each station uses 12-wire, color-coded electric cable with MS-type connector. Front mounting and removal make it ideal for the compact console installations required for centralized control.

3. *Patchboard*

Interconnecting the system in any desired manner, via color-coded electrical cable, the patchboard requires no solder connections or terminal boards—all connections are made by special taper pins. Each connection is identified by an alphanumeric combination. Numbers, run vertically, identify the components in the system, such as magnetic amplifiers, controllers, transducers, etc. Letters, run horizontally, identify the connectors leading into the patchboard. DC control power bus is in the center section—no AC voltages are used in the patchboard.

Easy front access permits simple changing of operations. Additional loops or components are readily added to the system.

A letter or phone call will bring you complete information on the PowrMag system. **Ask for Bulletin MSP-163.**

HAGAN
CHEMICALS & CONTROLS, INC.
HAGAN CENTER, PITTSBURGH 30, PENNSYLVANIA

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DIVISIONS: CALGON CO. — HALL LABORATORIES — BRUNER CORP.

SAVING TIME ON THE LINE

Sems

PERMIT HOPPER-FED DRIVING OF LOCK WASHER AND SCREW!

There's an opportunity for real production-time savings in Sems. They're pre-assembled to eliminate handling of separate lock washers and screws on the assembly line . . . can be applied with a hopper-fed screwdriver for extra man-hour economies. Broad selection of types and sizes available. Inquire today.

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conveniently located for fast service

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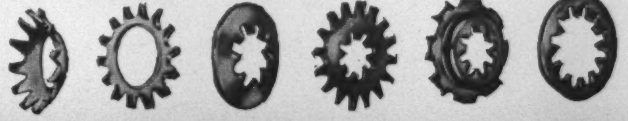
CANADA ILLINOIS TOOLS LTD. SHAKEPROOF/FASTEX DIVISION
Don Mills, Ontario, Canada

FOR GREATER PRODUCT DEPENDABILITY

Specify SHAKEPROOF® LOCK WASHERS on Sems

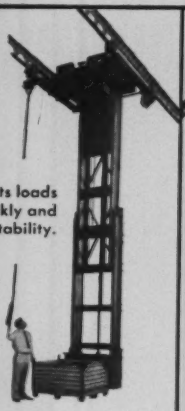
Each Shakeproof Lock Washer is especially designed to insure a firm grip in a specific type of application. They come in a wide variety of styles and sizes—all engineered for mechanical pre-assembly. Save time . . . order from the source nearest you.



Sems
pre-assembled screw and lock washer
SEMS is a development of Illinois Tool Works, Chicago

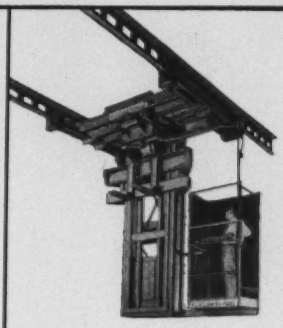
i t w

Fork easily threaded under loads by push-button control.



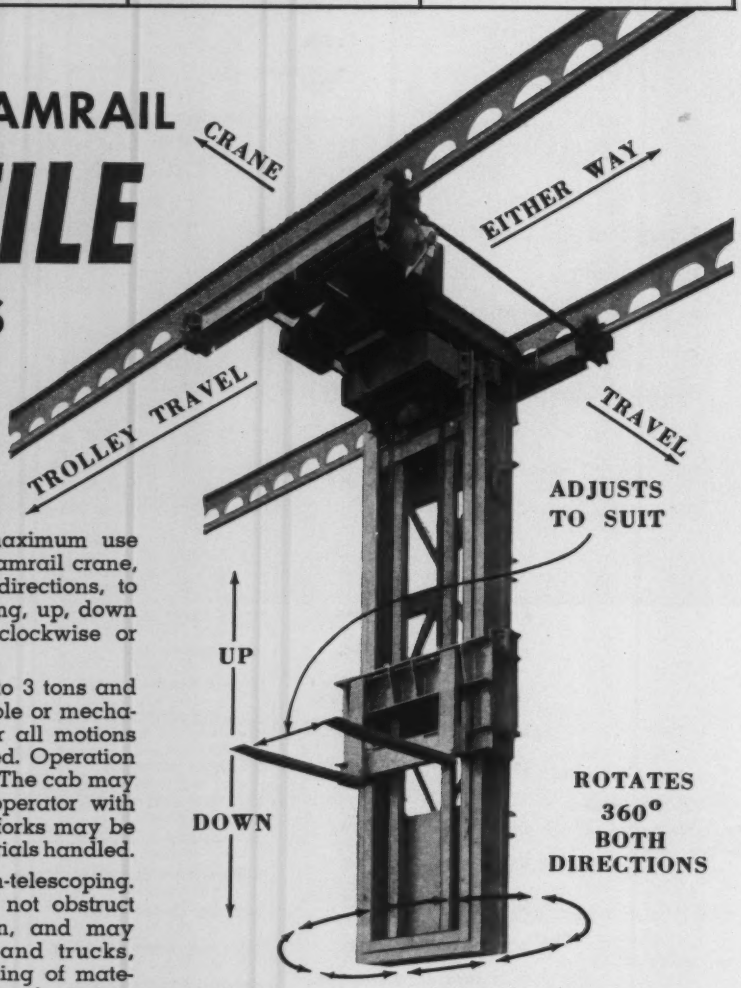
Lifts loads quickly and with stability.

Telescoping frame permits floor traffic to clear underneath.



This unit has cab for operator. It travels vertically and rotates with loads.

CLEVELAND TRAMRAIL
VERSATILE
STACKERS



THE maneuverability of Cleveland Tramrail stackers enables obtaining highly efficient handling coverage of a warehouse with maximum use of space. When on a Cleveland Tramrail crane, a stacker can be traveled in all directions, to front, rear or either side of a building, up, down and turned through a full circle clockwise or counter-clockwise.

Stackers are available for loads to 3 tons and lifts to 20 feet. They may be as simple or mechanized as the work requires. Any or all motions may be manually or power operated. Operation may be controlled from floor or cab. The cab may be traveled vertically to provide operator with maximum visibility of work. Lifting forks may be designed and spaced to suit the materials handled.

Design may be telescoping or non-telescoping. Telescoping type (illustrated) does not obstruct aisleways when in raised position, and may be traveled over railroad cars and trucks, thereby permitting the direct handling of materials to storage without need of transferring to other conveyances.

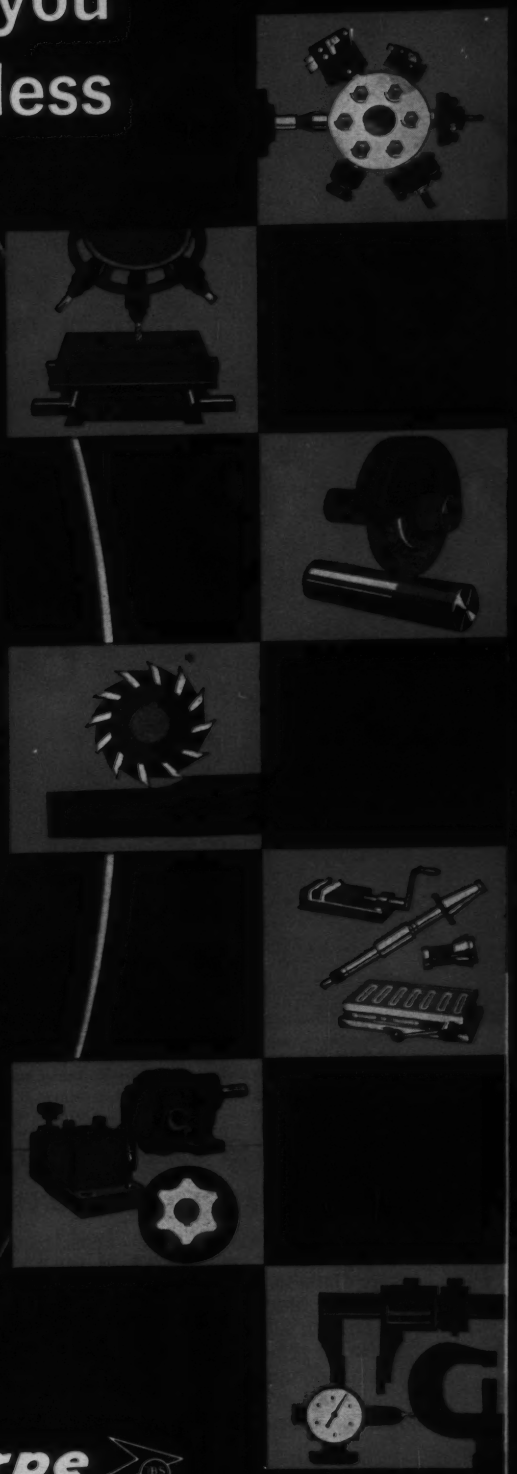
Cleveland Tramrail stackers and supporting cranes have much to offer. They can be designed to exactly suit your needs. Why not have a nearby Cleveland Tramrail engineer fill you in on the details.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4854 E. 290 ST. • WICKLIFFE, OHIO

to help you
make more for less



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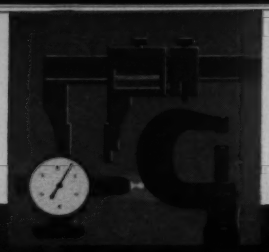
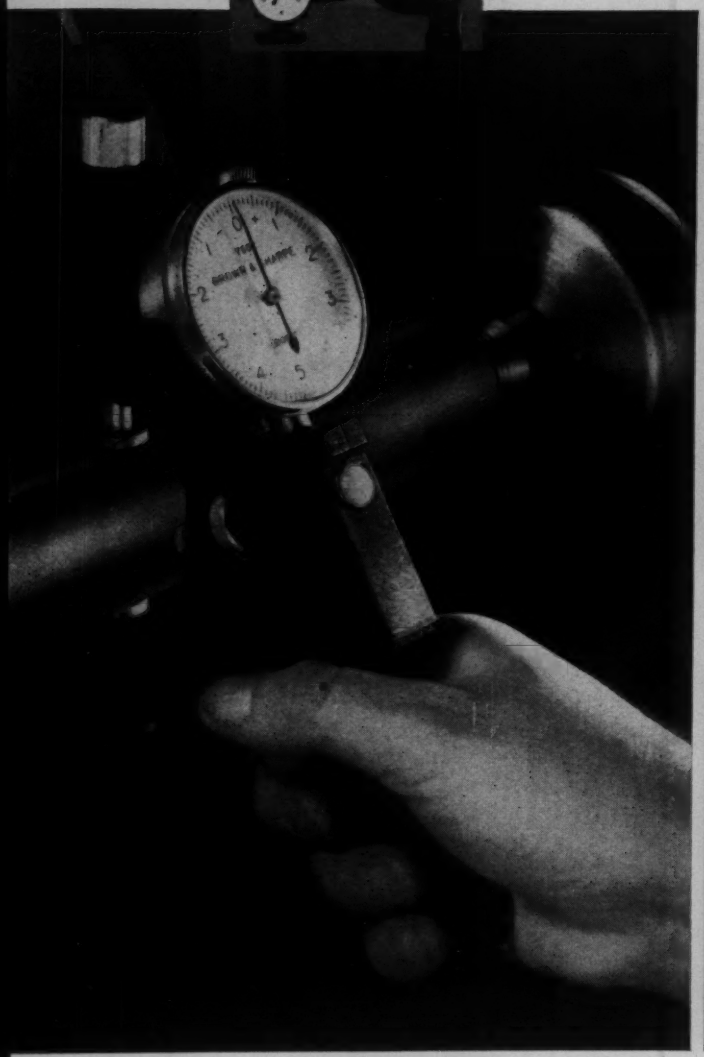
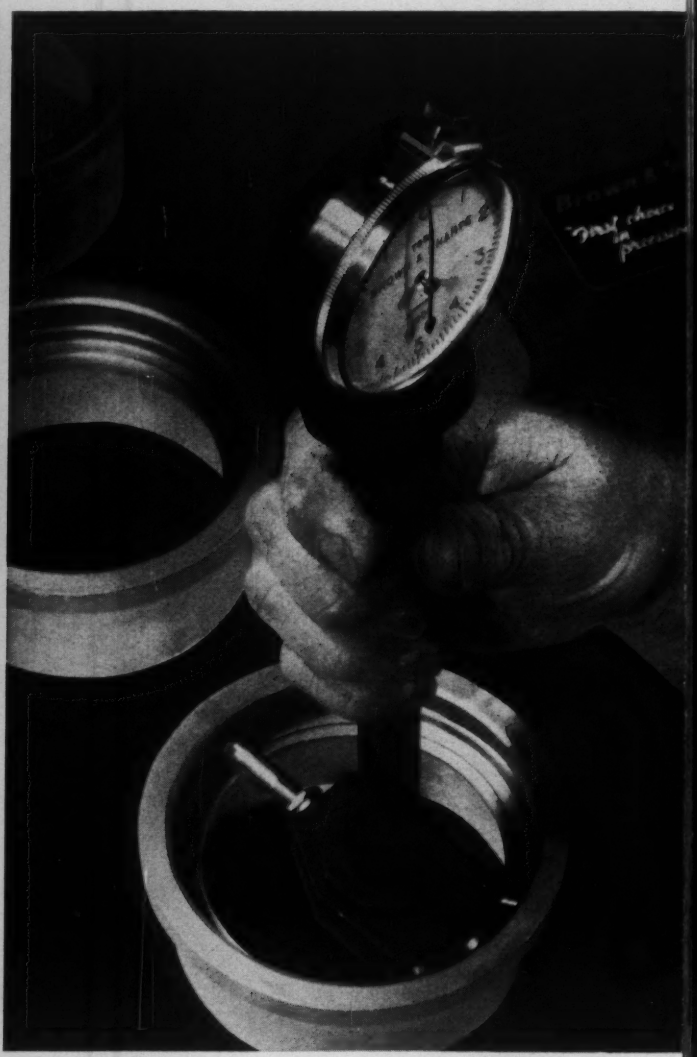
PRECISION CENTER



TO HELP YOU MAKE PRECISION MEASUREMENTS EASIER AND FASTER...





With one simple motion, B&S Dial Snap and Bore Gages slide onto (or into) the work. No adjusting and little "feel" is required, to get accurate ten-thousandth readings with these self-centralizing, spring-loaded tools. They spot exact work conditions, such as bell-mouth, out-of-roundness, etc. And by showing how much work is "under" or "over" — they save "borderline" pieces — aid setting of cutting tools.

B & S Dial Snap and Bore Gages tell you faster ...tell you more...in measuring production parts

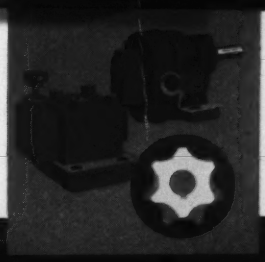
For precise measurements of outside dimensions and bore diameters — on a *production* basis — you can't beat Brown & Sharpe Dial Snap and Bore Gages!

They're faster than micrometer or vernier tools for a series of repetitive measurements — more accurate in unskilled hands. And they "tell more" about the work than fixed or comparator gages because they are *direct reading* over a complete *range*.

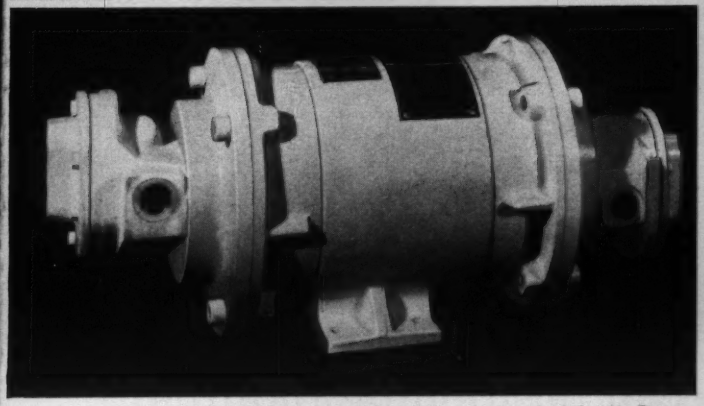
Four B&S Dial Snap Gages cover a range of 0″ to 4″ by ten-thousandths. Seven B&S Dial Bore Gages cover a range of ⅛″ to 13″ by ten-thousandths, with a minimum of interchangeable gaging heads and extensions. Ask your nearby industrial distributor to show you these economical, time-saving tools for precision production measurements. Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Be sure to see us at Booth 1131, ASTE Tool Show, Detroit, April 21-28

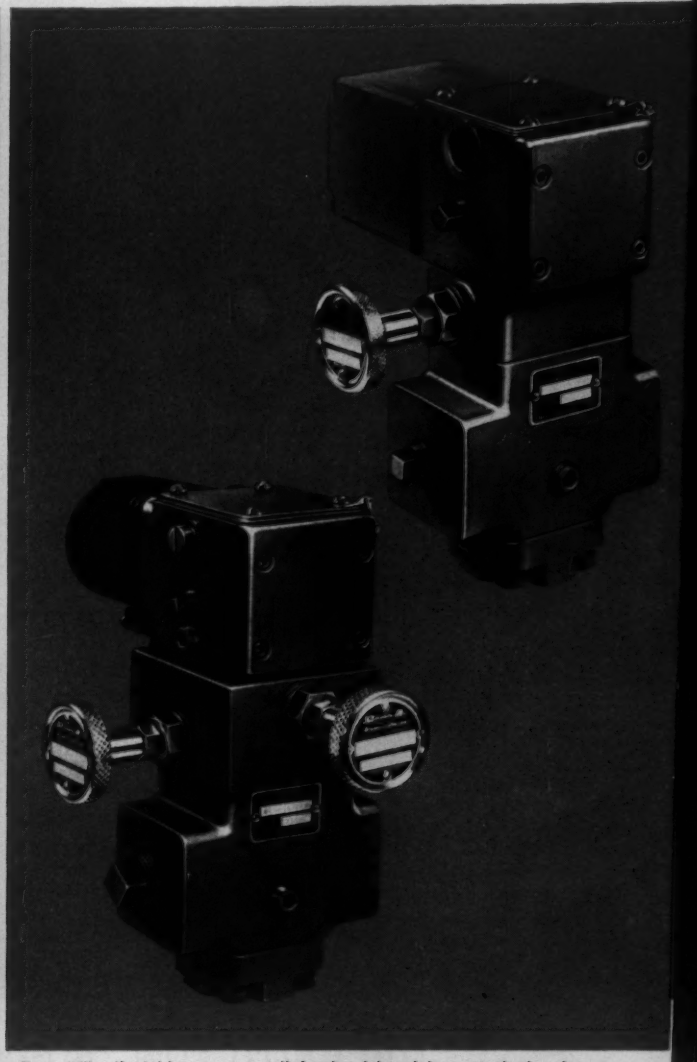
Brown & Sharpe PRECISION CENTER



TO HELP YOU HANDLE FLUIDS MORE EFFICIENTLY...AND FOR LESS



This tracking antenna (above) is an important part of the Air Force Ballistic Missile Early Warning System. Goodyear Aircraft Corp. developed it for R. C. A., prime contractor on the system. B&S pumps replenish oil in drive system; control position of drive pump yoke; lubricate entire system.



Type "J" adjustable pressure relief valve (above) has attached, solenoid-controlled pilot valve — provides automatic, full bypass of fluid at idling pressure. Type "D" dual pressure relief valve with solenoid control (below) — provides automatic choice of two, individually-adjustable maximum pressure settings.

Goodyear designers lubricate BMEWS antenna with B&S Pumps

Designers of this antenna's drive unit needed 4 pairs of pumps, mounted on double-ended motors.

B&S pumps were chosen for their self-priming ability from minus 65°F to plus 160°F; ruggedness and long life.

These and other advantages of Brown & Sharpe gear, vane and centrifugal pumps are clearly described in our new Pump Catalog 36P.

Send for your copy today! Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Double A develops first multi-purpose relief valves

Here are two more Double A "firsts" in compact valve units: Adjustable relief valves with *solenoid controls*.

Already successful in machine tools; foundry, steel-mill, mining, material handling and stretch-forming equipment — they can help *you* simplify your hydraulic circuits, too.

For details on these and the complete line of Double A hydraulic control valves, power units, Gerotor pumps — write: Double A Products Co., subsidiary of Brown & Sharpe Mfg. Co., Manchester, Michigan.

Be sure to see us at Booth 1131, ASTE Tool Show, Detroit, April 21-28

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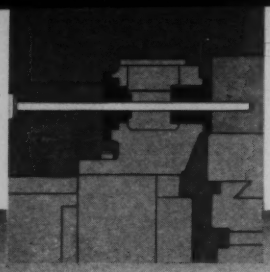
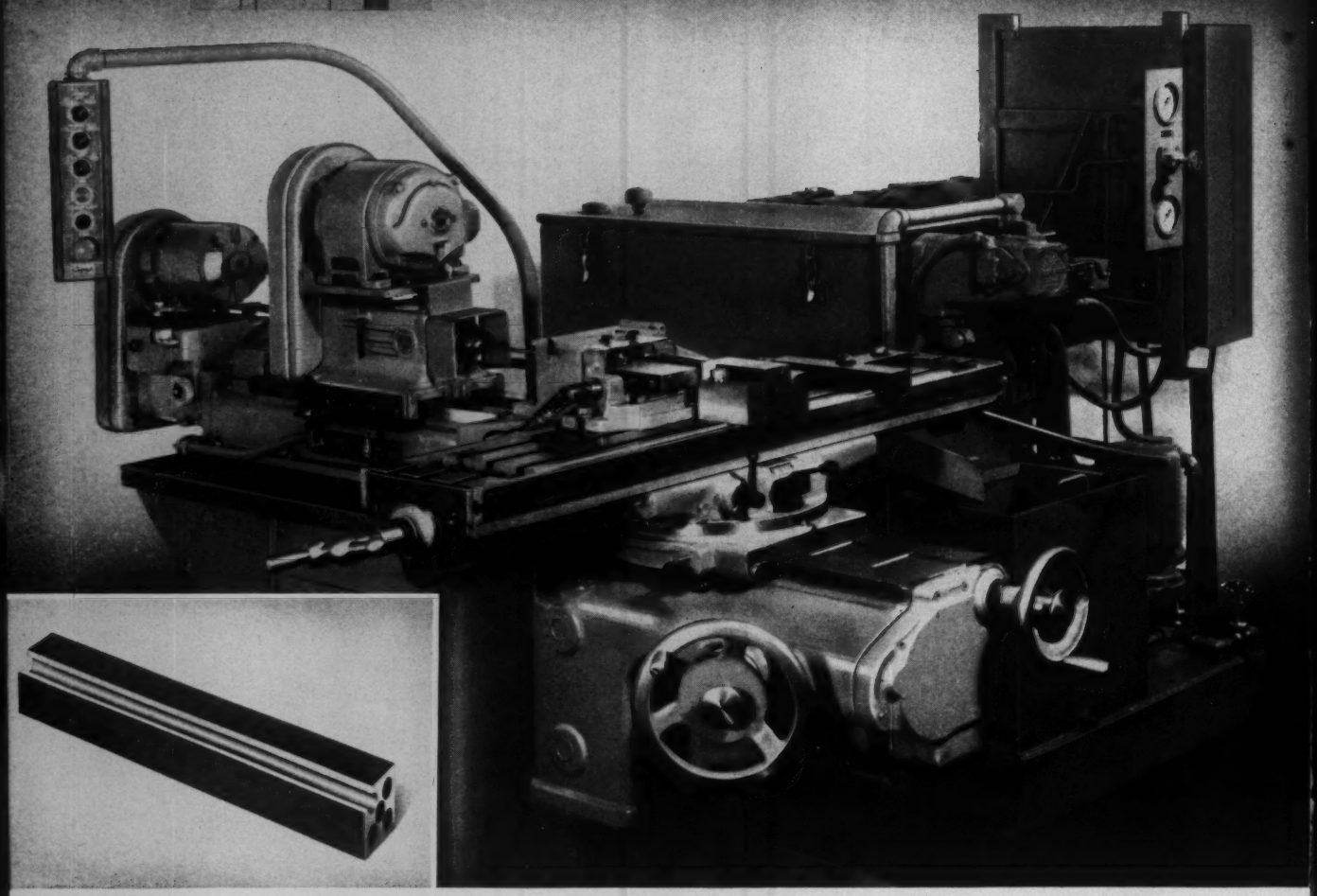
MMT-PE



TO HELP YOU REDUCE
DEEP HOLE DRILLING COSTS



Saves the extra cost of special positioning fixtures - the new Brown & Sharpe Deep Hole Drilling Machine

Simplified set-ups, tooling economy, and exceptional job adaptability are basic advantages of this new, revolving drill type machine, along with many other features unavailable in conventional equipment used for "gun drilling."

The machine itself provides all directional adjustments needed for fast, accurate positioning of the work piece. Standard vises or other simple clamping devices serve to hold the work for most jobs. You avoid the expense of special, complex positioning fixtures for multiple hole location.

The chip box secured to the column of the machine supports the front drill bushing in accurate alignment with the axis of the drill spindle, maintaining hole surface finish in the low micro-inch range. Positioning controls with the same built-in precision as in Brown & Sharpe Milling Machines assure accurate center location and hole alignment.

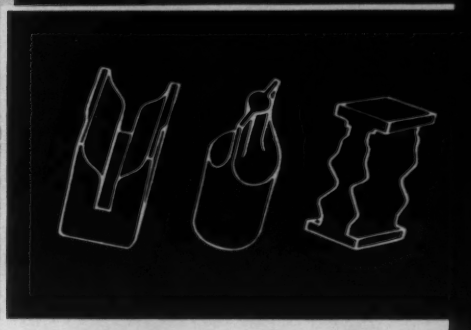
Drilling-head speeds from 2500 to 10,000 rpm, are available as specified. The machine takes drills from ⅛" to 1" dia., and provides up to 12" feed stroke (24" with optional, extra equipment). The high pressure coolant unit (in background) will provide up to 30 gpm of oil and pressures up to 3000 psi.

Find out how the B&S Deep Hole Drilling machine can be adapted to your needs — with special arrangements, when required, such as optical positioning and tape control. For complete information, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

Brown & Sharpe PRECISION CENTER

MMT-PE

TO HELP YOU GRIND MORE FOR LESS



Up to 300% faster form grinding in carbide, ceramics – Brown & Sharpe MICROMASTER with VISUAL GRIND

VISUAL GRIND, the built-in comparator on the B&S 618 Surface Grinding Machine, permits tool and die makers to meet today's demand for intricate shapes in super-hard materials with spectacular savings in work hours and wheel costs.

Skilled operators can save up to 300% in set-up and grinding time. There is no need to remove work for frequent inspection with separate equipment. Semi-skilled workers, also, quickly learn to "follow the line," and match the clearly visible, true image of the work to the form layout drawn on the screen. Wheel costs are drastically reduced in grinding carbide and ceramics — any contours can be reproduced with a few simple wheels.

An unlimited variety of forms can be produced in punches, dies, and similar work — with through, blind, or template grinding — using standard equipment and simple attachments.

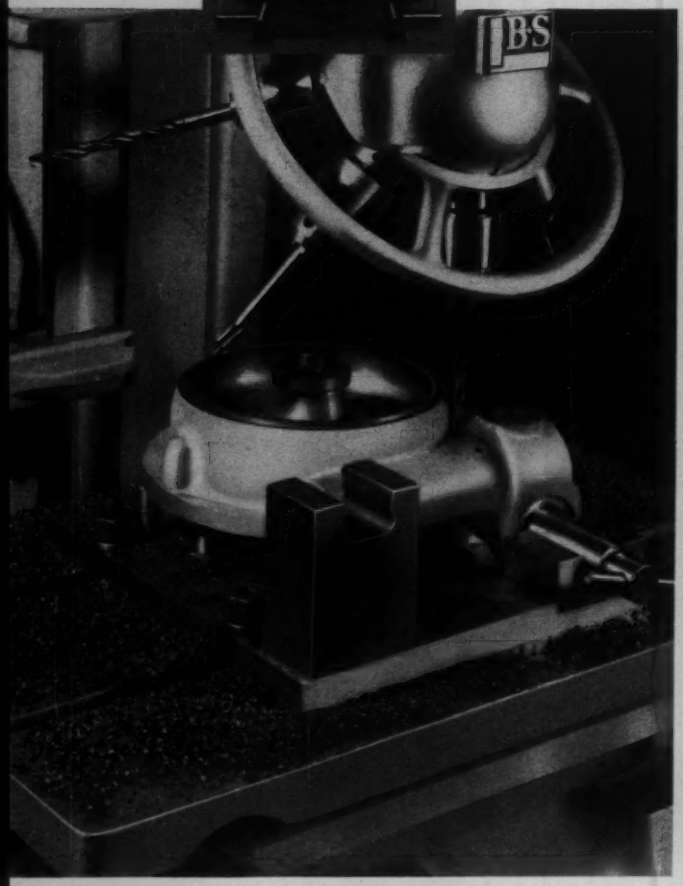
The MICROMASTER® with Visual Grind provides all the extra profit-saving advantages of the new B&S 618 Surface Grinder. It can be readily used for other grinding, of surfaces up to 6″ x 14″, without disturbing the optical system.

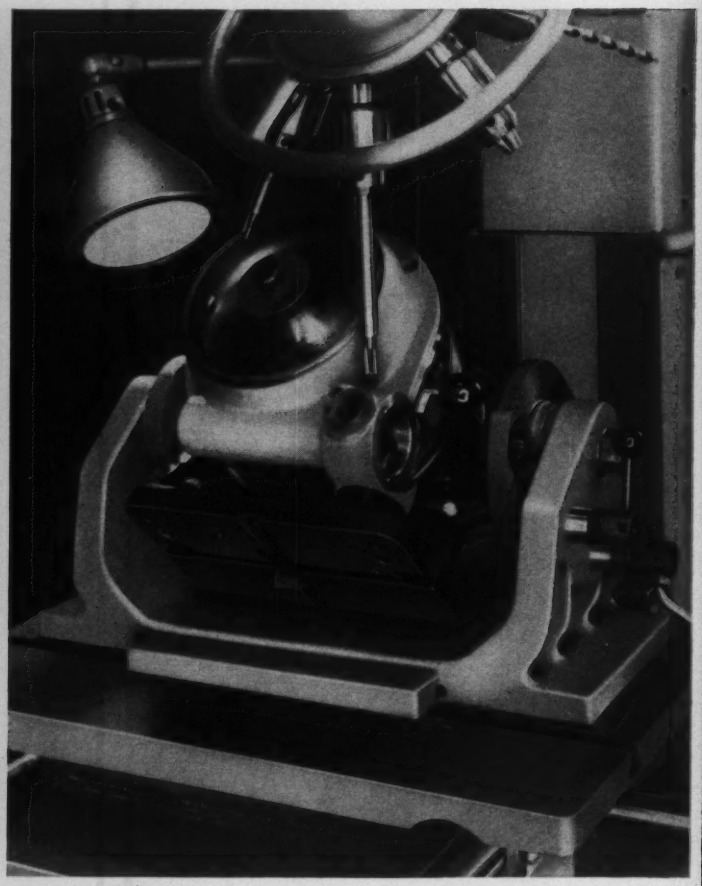
THE VISUAL GRIND® system is manufactured by The Cleveland Grinding Machine Co. and is sold only by Brown & Sharpe. For details, write: Machine Tool Division, Brown & Sharpe Mfg. Co., Providence 1, R. I.

Brown & Sharpe PRECISION CENTER

MMT-PE

TURRET DRILLING MACHINES TO HELP YOU DRILL MORE FOR LESS





Large parts machined 300% faster with simple tooling on Brown & Sharpe Turret Drilling Machines

For large as well as small parts, the B&S Turret Drilling technique drastically reduces production drilling costs.

The typical machine casting shown requires machining of 23 holes spaced from ½″ to 12″ apart — drilling, tapping, and counterboring in 4 planes. With simple B&S designed fixtures, mounted on a 10½″ x 12″ B&S Positioning Table, accurate hole location (within .001″) takes only a few seconds in each sequence. Production time is one-third that required for conventional drilling.

Rapid, accurate positioning methods can be similarly adapted for big savings in production drilling of your larger pieces. On the Model A Turret Drilling Machine shown, you can machine any hole pattern within a 24″ circle.

Brown & Sharpe Turret Drilling can save up to 80% of your costs for conventional gang-drill, box jig methods. It permits multiple operations at a single station — accurate duplication of any hole pattern without expensive jigs. You save in work transfer and set-up time, in tool wear and maintenance, in capital investment and floor space.

The BROWN & SHARPE Tooling Clinic designed the fixtures shown above to take full advantage of turret drilling economy. The work is held as shown (left) in a simple clamping fixture for the first sequence, 24 operations in 8 holes. It is then turned over in the same fixture for 23 operations in 8 holes. The trunnion with index head (right) orients the work for the final sequence, 20 operations in 7 holes, in 3 planes. Send your parts and drawings for a free estimate of savings with turret drilling. Write: Turret Drilling Division, Brown & Sharpe Mfg. Co., Providence, Rhode Island.

Brown & Sharpe PRECISION CENTER

Machine part broken?

...make a new one fast with

LaSalle all-purpose STRESSPROOF STEEL BARS ...for maintenance

A broken machine part? You can cut your down-time from days to hours by machining your own replacement parts from LaSalle all-purpose STRESSPROOF. There's no need to wait for a new part to be shipped from the factory... or to put up with the delays of heat treating and secondary operations.

Here's why STRESSPROOF *will help you get back into production faster (and minimize future breakdown possibilities):*

- STRESSPROOF needs no heat treating. *Now available in sizes up to 4" rounds.*
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- It's strong . . . 100,000 psi.
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24-Page booklet tells complete story of all-purpose STRESSPROOF

Use this coupon to request your copy of "How to make your own machine and repair parts quicker and easier." It tells how to make parts like these easier and faster: *arbors • axles • bolts • bushings • fasteners • gears • spindles • shafts • studs, etc.*

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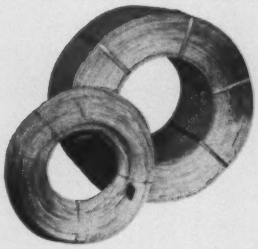
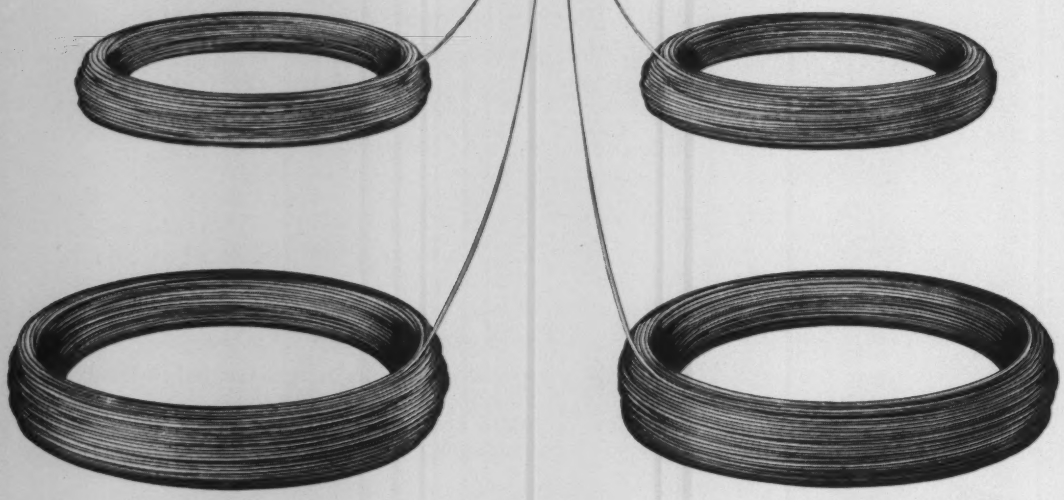


SEE THE DIFFERENCE— New 1000-lb. coil is neatly wound for maximum efficiency.



Since phosphor bronze is one of the most difficult non-ferrous alloys to make satisfactorily into wire, how does Riverside keep so far ahead of competition? Here's one of the reasons: *Continuous casting*, a radical new and secret process, exclusive in America at Riverside-Alloy.

A special method of continuous casting eliminates the porosity of wire cast in water-cooled molds . . . brings you weld-free wire in coils up to 1000 lbs.

SPEED. With this new large coil your production runs are longer than ever before. Riverside wire speeds and smooths your fabrication and scheduling.

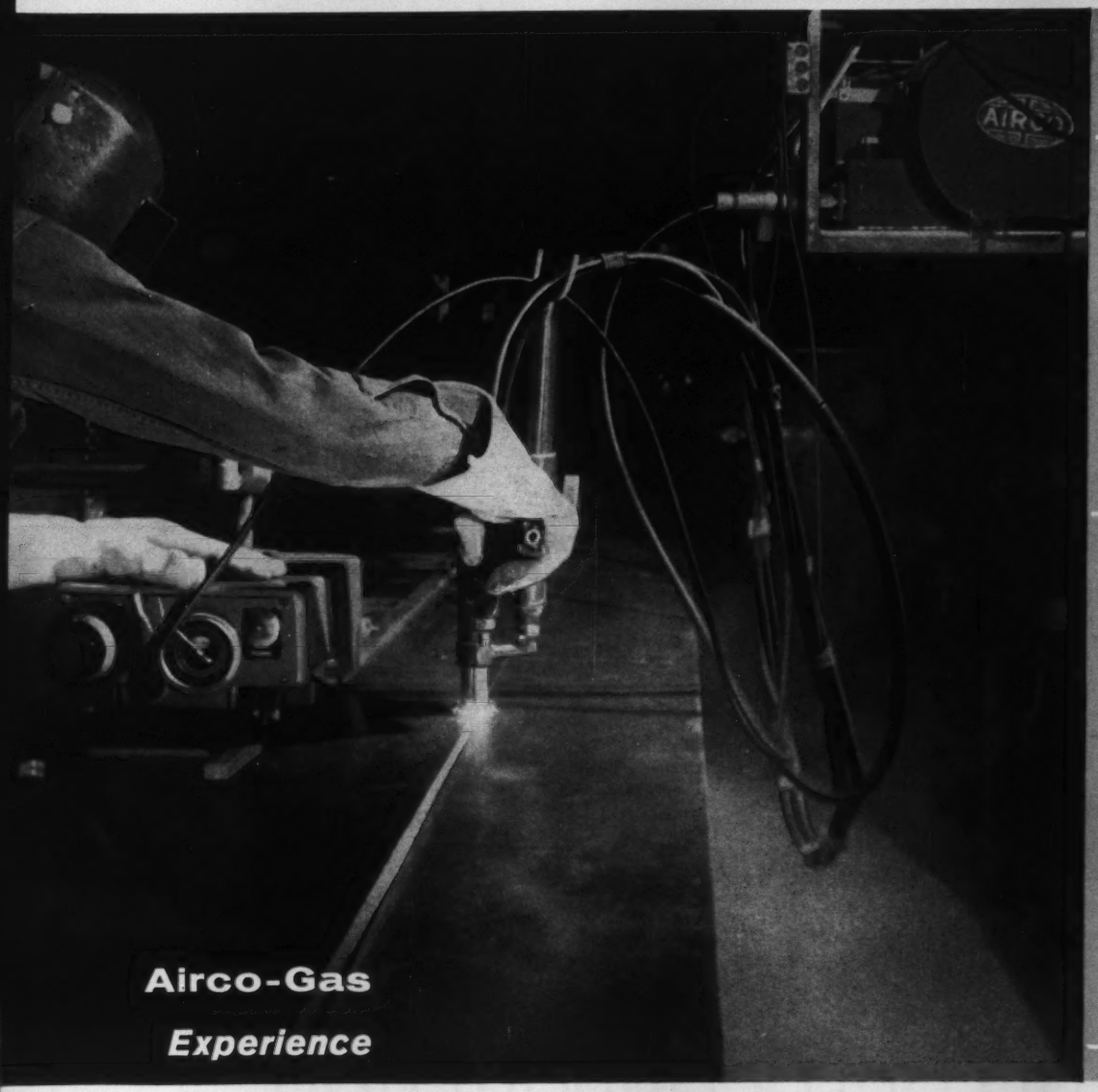
QUALITY. Riverside *continuous-cast* material is denser, more homogeneous than antiquated mold-cast products. Wire drawn from the continuous coil is stronger, free from weak spots which can stop production and cause high reject rates.

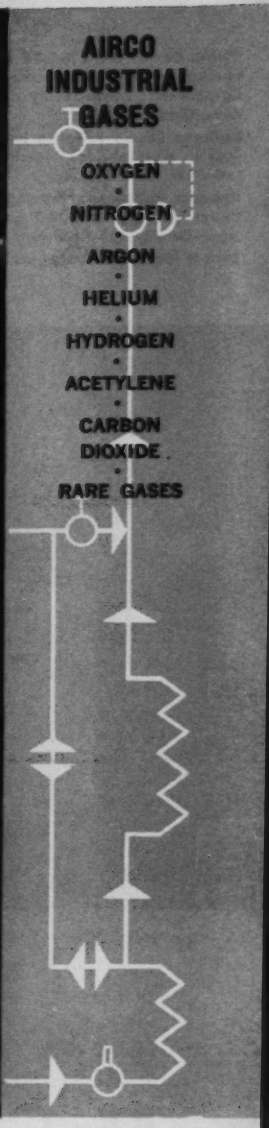
Your production equipment can be easily adapted to hold the new 1000-lb. coils of Riverside continuous-cast bronze wire. Find out how you can save with this remarkable new process. Write *Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.*

RIVERSIDE-ALLOY METAL DIVISION PORTER **H.K. PORTER COMPANY, INC.**

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S. A.; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD.

AIRCO GAS — ARGON, IN THIS CASE — and Aircomatic® equipment — do double duty here. An aluminum trailer manufacturer cuts aluminum plate to size with Aircomatic and argon . . . then welds the trailer parts — with the same equipment.





can benefit your operation, too

Working with exotic or reactive metals? Keep them tame as a puppy with Airco helium or argon. Whether you're melting, casting, welding or even arc-cutting them—they work easily under their protective blankets of Airco gas.

And remember that other Airco gases such as oxygen, nitrogen, hydrogen, acetylene and carbon dioxide are always ready to serve your metalworking operations.

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Direct Costs: these include direct dollar savings as realized by the McCulloch Corporation . . . an "every day" job for Acme-Gridleys.

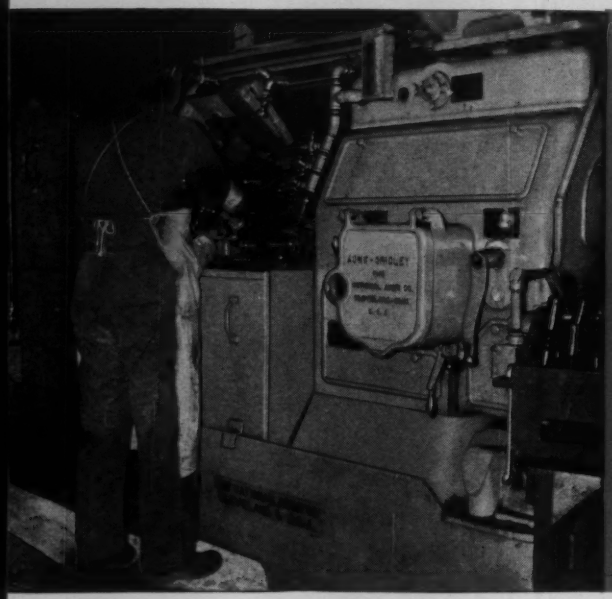
Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc.

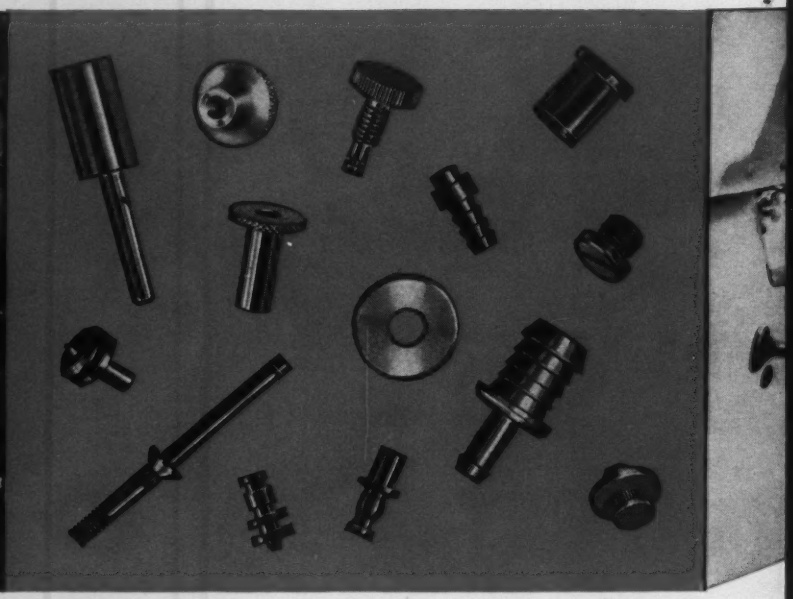
Product Redesign: teaming with your design group to take full advantage of Acme-Gridleys' cost reducing capabilities.

Direct Material Costs: our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems.

Make-or-Buy Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment.

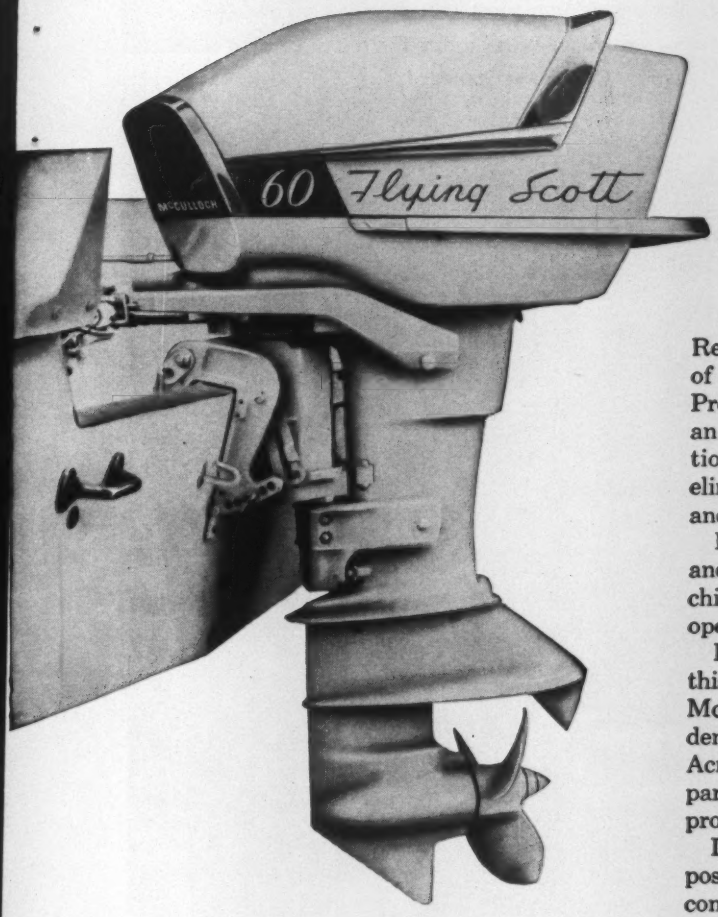
Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.





McCULLOCH CORPORATION LOGS 66% COST REDUCTION

. . . with Acme-Gridleys



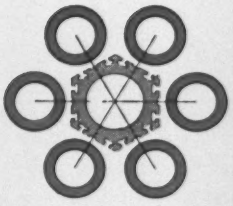
Reduced cost-per-piece of tilt-lock knobs was but one of the enviable savings made possible for the Marine Products Division of the McCulloch Corporation by an Acme-Gridley RA-6 Spindle Automatic. In addition, McCulloch boosted output 200%, practically eliminated scrap losses, and greatly improved finish and final appearance of this small but critical part.

Previous production methods required one primary and two secondary operations. Now, complete machining—including deburring, is done in one automatic operation on the Acme-Gridley.

Dramatic savings in the production of parts like this make Acme-Gridleys a vital, cost-saving cog in McCulloch's highly efficient production set-up. Evidence of this leading manufacturer's high regard for Acme-Gridley efficiency is the fact that 14 different parts for their popular 60HP "Flying Scott" are produced on the rugged, versatile RA-6 Automatic.

It will pay you to thoroughly study the savings possible with Acme-Gridleys. Call, write or wire for complete details on industry's most modern approach to tangible cost reduction.

Pioneer in Circumferential Automation



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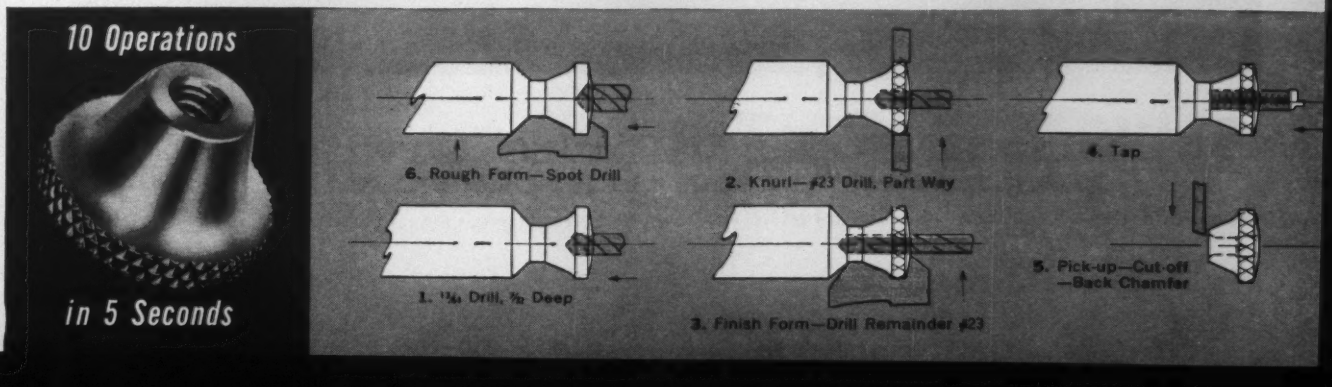
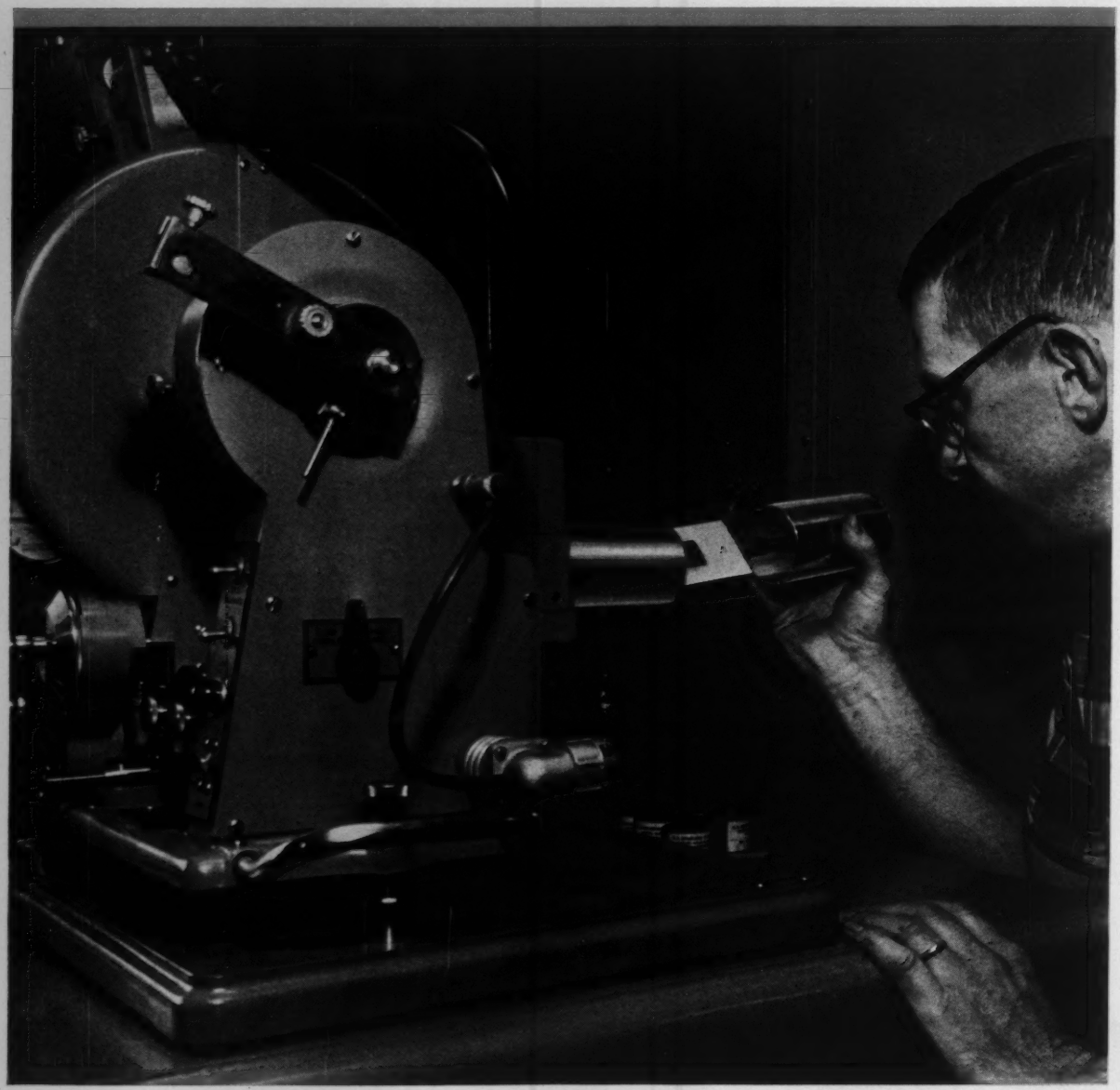


Laboratory facilities at Standard have kept well in step with the revolutionary advances which have been made in the field of metallurgy during the past decade. Plant facilities, too, are geared to produce even the most exotic of special alloys which today's industry demands.

And Standard's famed personalized service means that your most difficult problems can be resolved by our metallurgists and engineers and assures a finished product which meets your most exacting requirements, delivered in record time. Write today for the illustrated booklet, "Quality Control at Standard."



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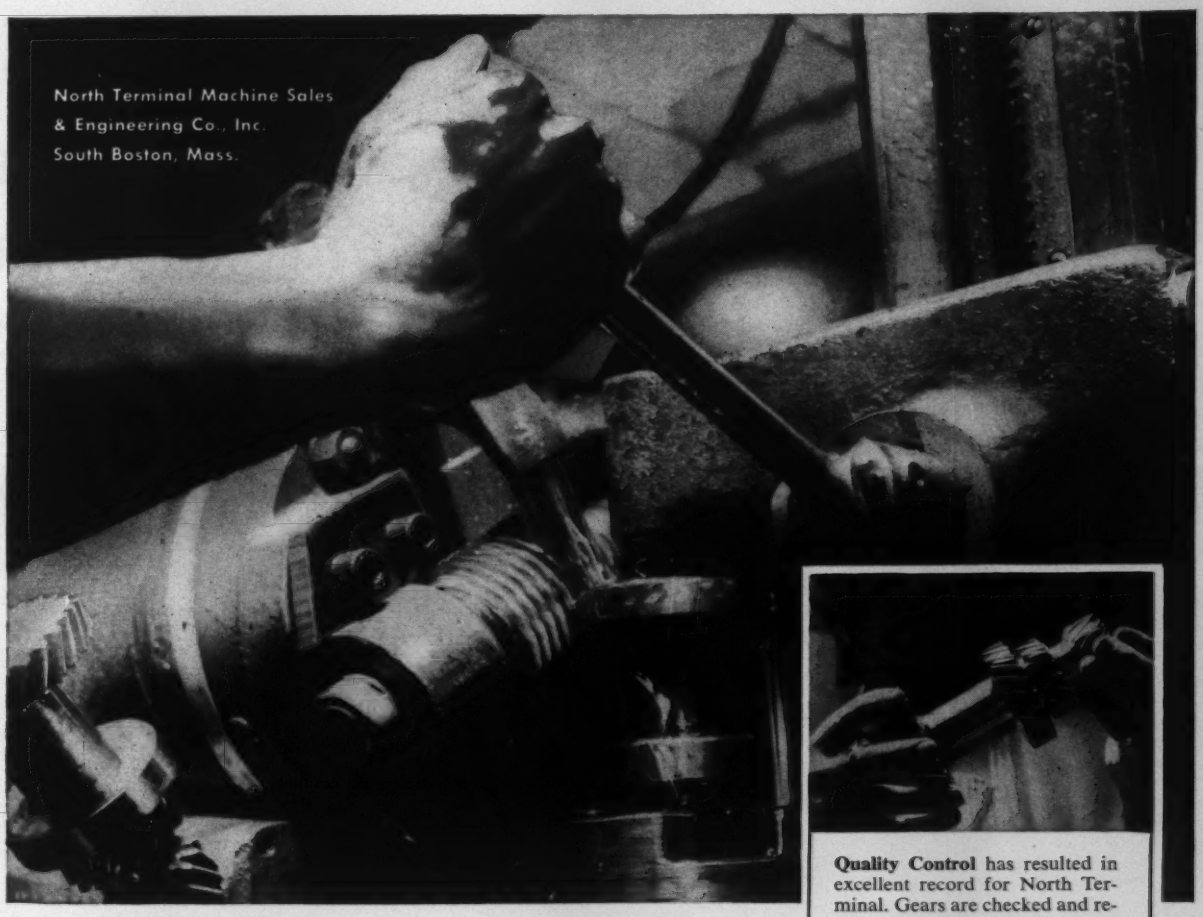

Quality Control has resulted in excellent record for North Terminal. Gears are checked and rechecked after each step in production. Quality lubricants have helped hold to close tolerances.

Hob Life Increased 250% with Cities Service Chillo 10 Cutting Oil

North Terminal makes replacement gears for automobile transmissions. In a day's time the firm—which makes the gears from raw stock to finished product—completes up to 5600 gears. Producing in quantities like this, hob life is an important consideration in *cost* of production as well as *quality* of production.

Previous cutting oils were tested on the gear hobbing machines and they resulted in hobs producing as low as 87 gears before replacement. Cities Service Chillo 10 cutting oil under the same conditions resulted in over 200 gears with a superior finish before a hob replacement was necessary.

Edward W. Malley Jr., President of North Terminal, states, "We didn't choose Cities Service cutting oil blindly. Many competitive oils were tested before we were satisfied that Chillo 10 was superior in every way."

Even if you're satisfied with your present cutting oil, a test of Cities Service Chillo 10 may give you a very pleasant surprise. Test after test under actual manufacturing conditions has shown Chillo 10 to give longer tool life and superior finishes.

Arrange for your own test by calling your nearest Cities Service office or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, New York.

5600 Gears per day or the equivalent of 800 replaced transmissions are produced every day by North Terminal. Gears are made for all makes of cars with a good portion of production being shipped overseas.

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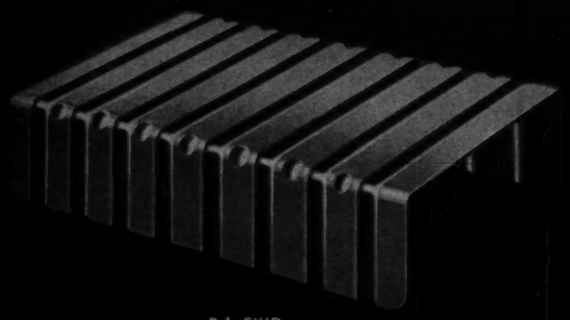
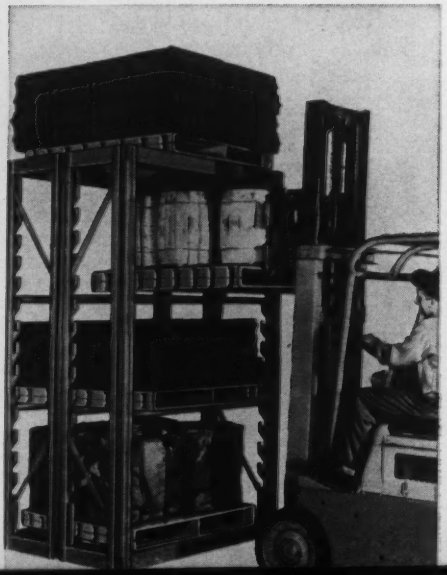


P-1 SKID

P-135 BAR CARRIER

REPUBLIC METAL LUMBER® solves framing problems fast! Simply measure, cut, and assemble with ordinary bolt and nut fasteners. It's the ideal material for constructing tailor-made storage facilities for hard-to-handle stock-and-store raw materials, industrial, and warehouse products. Available in two gages, two widths, in standard bundles of either 10- or 12-foot lengths. Order from your Republic-Berger warehouse. Send coupon for more information.

REPUBLIC PALLET RACKS simplify palletizing and stacking, save space. It is easy to stack and store bulky, uneven, odd-lot, and fragile materials. Tubular steel supports adjust every six inches to handle palletized material of any height. You can select pallets from any level. Two-way entry permits loading and unloading from either side. Send coupon for specifications.



PR-15 STACKING SKID

Republic Materials Handling Equipment is designed and built to handle heavy weights in heavy-duty service. Park Drop Forge Company, Cleveland, Ohio, pioneer in the forging industry, has been using Republic Skid Units for some time.

Forgings, still very hot, weighing up to 3,500 lbs., are placed two on a skid and stored in the yard for cooling before shipment. Nearly 7,000 lbs. of hot metal is punishment for any skid, but Republic Skid Units withstand this severe service year after year.

Republic Skid Units are made from highest quality steel and feature reinforced corrugated design for extra strength. Lifting lugs, stacking brackets, special fork entries, can be added for adapting basic Republic Skid Units to your particular operations.

Let Republic Materials Handling Engineers work with you in planning practical and economical ways of using basic Republic Units in solving materials handling and containerization problems. Call your Republic representative, or write direct.

REPUBLIC CAN DO IT FOR YOU with complete sheet steel fabrication facilities. Contract manufacturing is a full-time operation at Republic's Berger Division. Engineers work with you in developing your product, and in solving manufacturing, assembly, and delivery problems. Well rounded stock of tools, dies, and a complete machine shop. Modern production lines for shearing, punching, forming, and painting. To learn more about Republic-Berger contract facilities, call or write today.

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- ☐ Republic Materials Handling Engineering Service
- ☐ Republic Skid Units
- ☐ Pallet Racks
- ☐ Republic METAL LUMBER
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This versatile castable is available in two types: 1. ALUNDUM 33-I Castable, made up principally of pure fused aluminum oxide *bubbles*. Its light weight and high insulating properties suit it for use in furnace applications subject to high temperature radiation, but mild gas and flame erosion. It is often used as a back-up for ALUNDUM 33-HD material in linings and roof arches. 2. ALUNDUM 33-HD Castable, made up principally of dense, fused *grains* of pure aluminum oxide. It is ideally suited for forming dense, monolithic surfaces where conditions are more severe — provides positive protection against flame impingement and abrasion.

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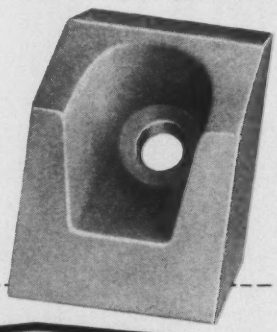
Imagine the savings in making complex shapes like this tapping block right *in your plant.*



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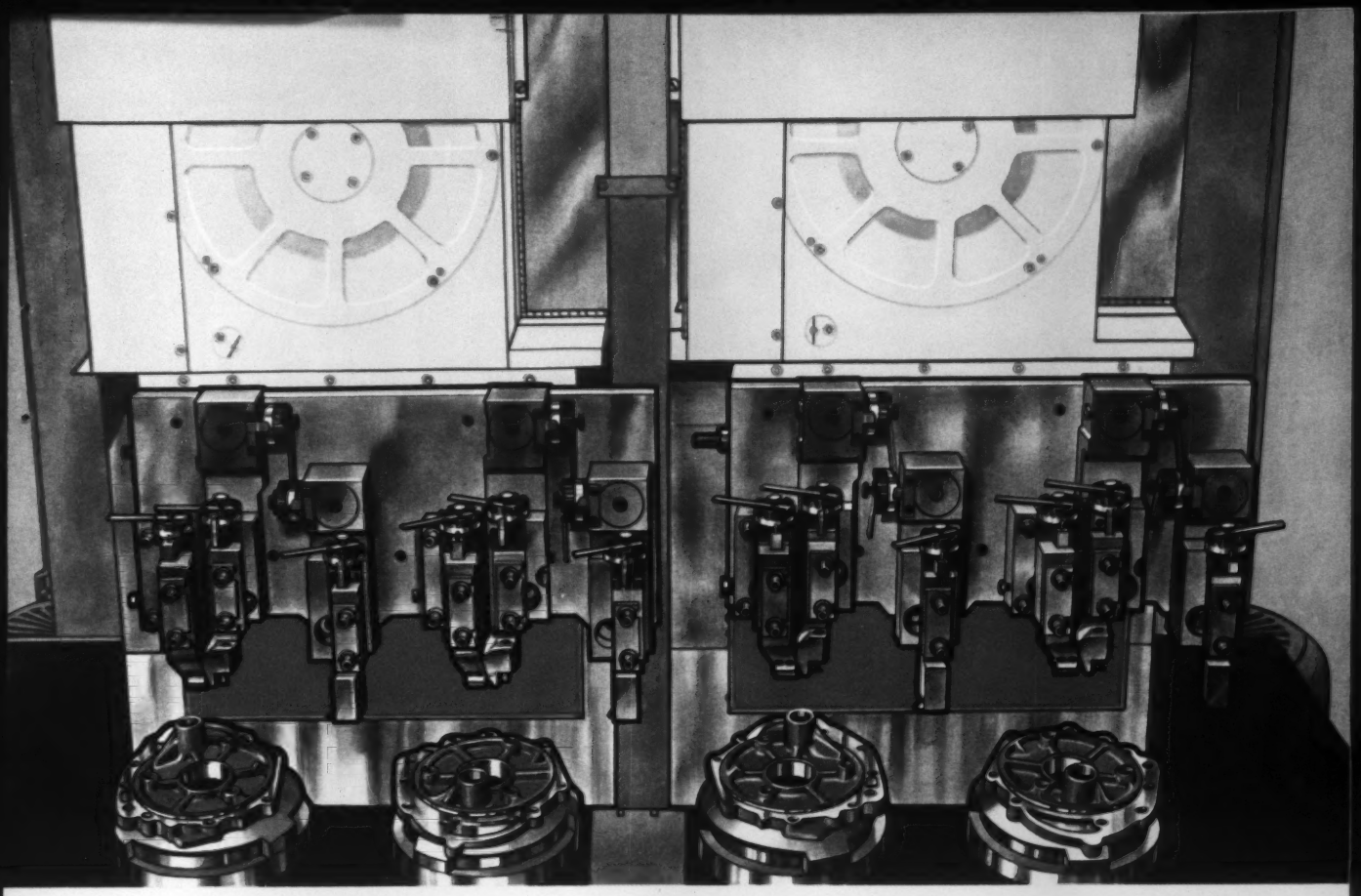

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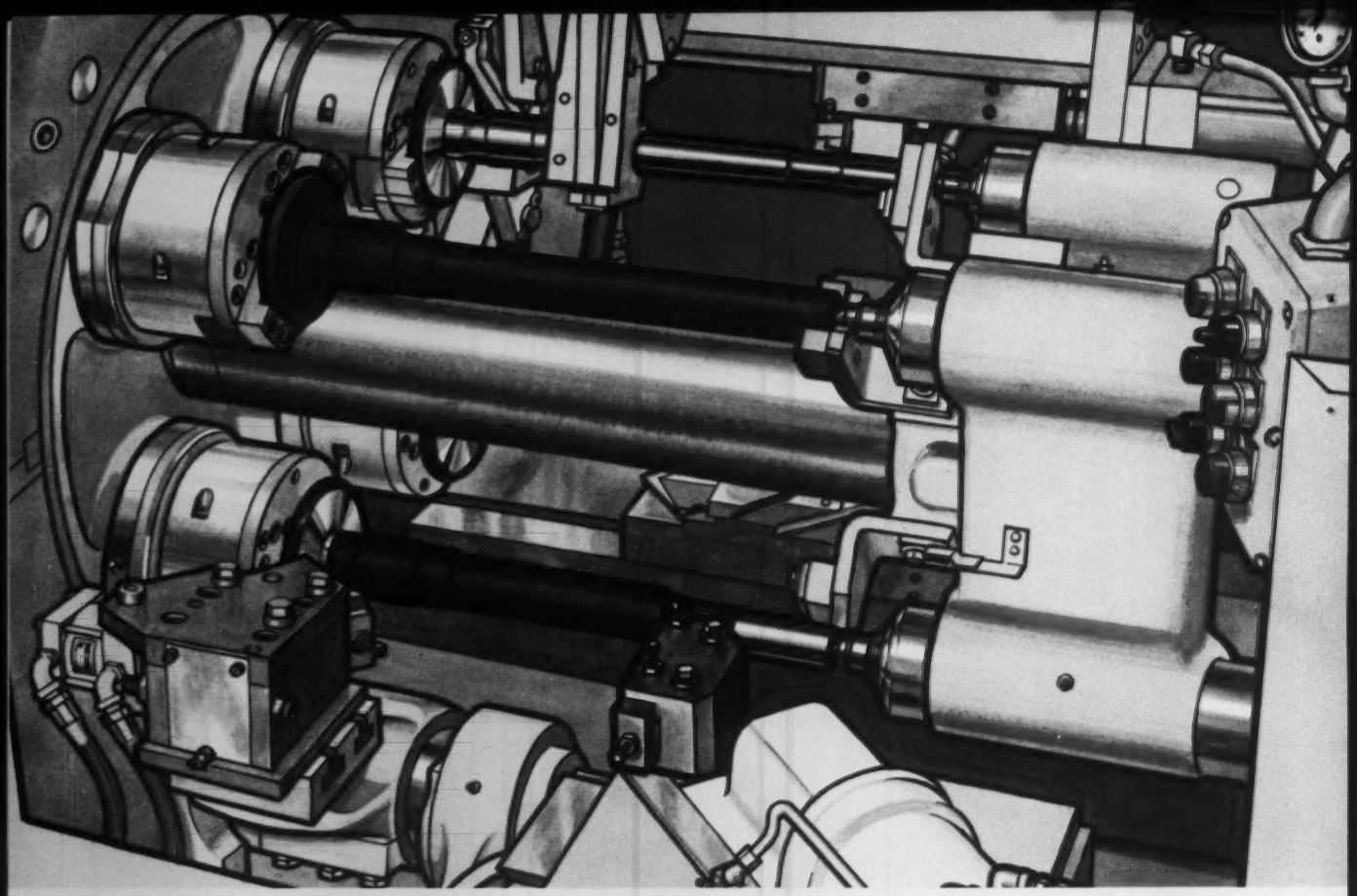

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Economists are making startling predictions on this year's increase in productivity. They say it will be twice that of recent years—up as high as 10% in some manufacturing industries.

Whether or not these predictions come to pass, it's certain that it won't happen in plants using outdated equipment.

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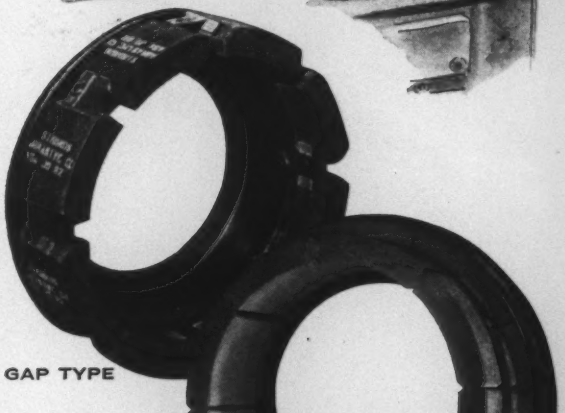

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gives you local stocks of 16,000 specialty steel items for immediate delivery

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Why not simplify and speed up your specialty steel purchases by relying on your local Crucible warehouse? The advantages of Crucible's entire integrated operation, from mining the ore to steelmaking and warehouse delivery, are all available through the nearby source. *Crucible Steel Company of America, Dept. PC06, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

Local warehouse can fill both large and small orders from stocks like these of hollow tool steel sections and solid rounds.

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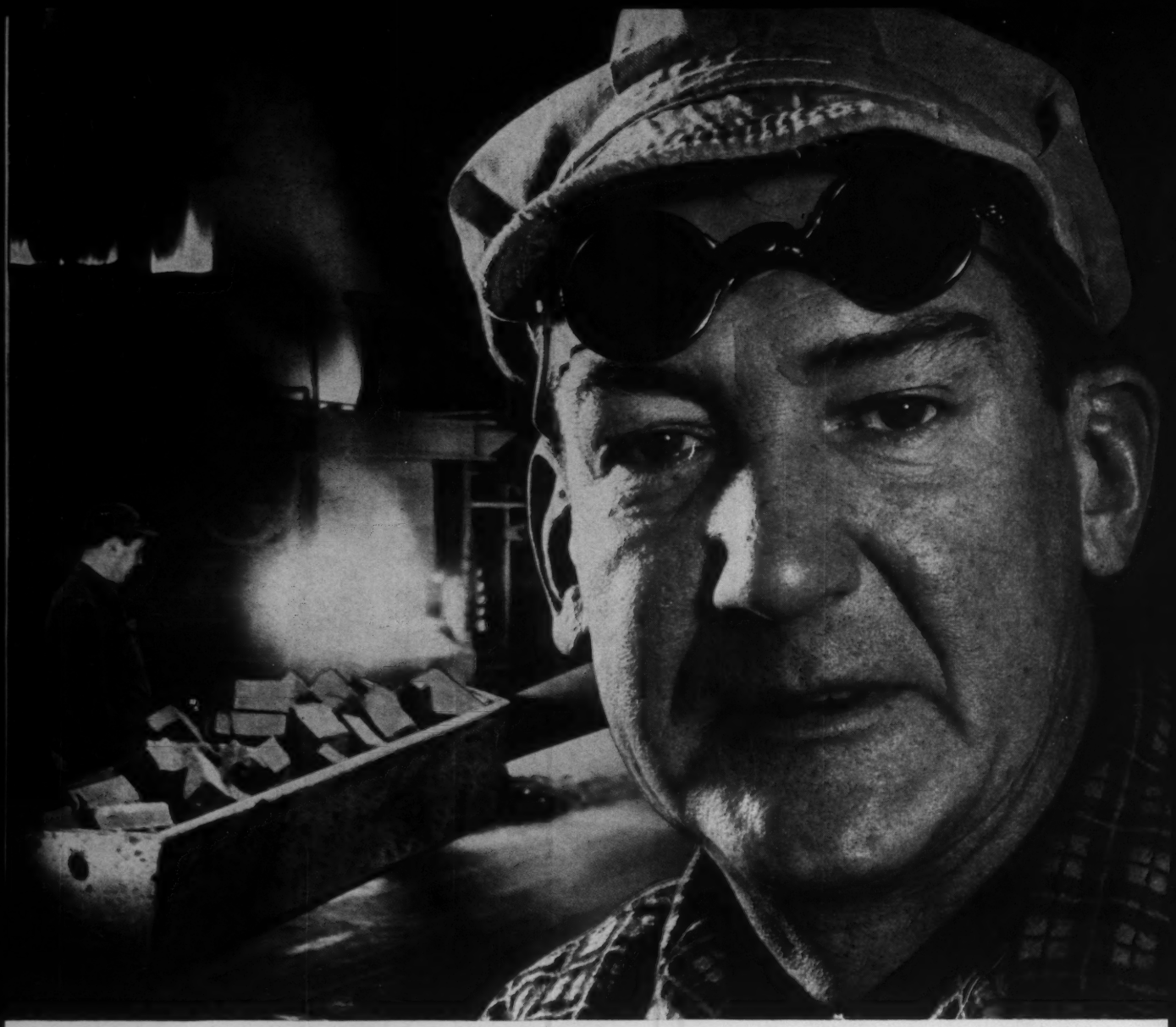

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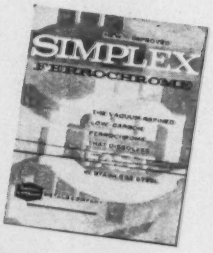

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LOOK FOR A CHANGE IN MACHINE TOOL policies in the Defense Dept. Prodded by two independent studies, the services can be expected to revise their thinking on tool reserves. One significant point will probably be emphasis on the sophisticated tools that will cut lead time on intricate missile parts.

THE THREAT OF SERIOUS INFLATION this year is waning. And a steady price level is likely for the balance of the year. Over-optimism earlier this year created inflationary pressures. Now, Government economists believe that inflationary forces are being diluted. Business is still good, but less inflationary.

TREND TO COMPACTS DIDN'T END WITH passenger cars. A Falcon truck is coming out soon and other automakers may follow. Corvair may have a delivery model out this fall and truck specialists are getting compact-sized models ready for the market.

TOUGH MARKETING PROBLEMS confront steel foundries if they are going to reach a predicted 10 pct sales gain this year. One is low priced imports. Result is a cost-cutting drive with capital spending for new, more effective equipment.

"RELIABILITY" IS TAKING ON NEW MEANING as metalworking meets new, greater demands on its products. One result is a greater need for more advanced testing equipment and a greater appreciation of reliability engineering all down the line.

SHIPMENTS OF INDUSTRIAL FASTENERS moved up in January. The Industrial Fasteners Institute index for January was 160, unadjusted; 149, seasonally adjusted (1947-49=100). December, 1959 Index was 138, unadjusted; 147, adjusted.

SPENDING FOR NEW PLANTS AND EQUIPMENT is expected to reach $37 billion in 1960. The annual survey of the Securities and Exchange Commission and Dept. of Commerce indicates a 14 pct, $4.5 billion increase from 1959.

SPENDING FOR NEW HIGHWAYS IN 1960 will be about at the 1959 level of $1.8 billion. But pressure is mounting for a speedup in the program. Some governors want extra taxes and loans to push the program to $2.5 billion a year for the next few years.

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Do Professional Employees Require Special Handling?

Today's engineers and scientists are made from a different mold than those of the past.

And they don't respond well to many traditional management practices.

▪ Does management understand engineers and scientists?

Not as well as it should. And this lack of understanding has resulted in a failure to make full use of these human resources.

There is a growing gap in communications between management and scientific and engineering personnel in industry. And the reasons for this are many.

One of the most important is the fact that today's engineers and scientists are different from those of the past. The rapid growth of research and development programs has resulted in a new type of technical talent.

A "New Breed"—Motivation for many who enter engineering and science fields has shifted to the "self," observes L. E. Danielson, associate professor of the Univ. of Michigan School of Business Administration. Dr. Danielson discusses the "new breed" in "The Characteristics of Engineers and Scientists," a book just published by The Univ. of Michigan Bureau of Industrial Relations.

He bases his findings and recommendations on interviews with 44 executives, 91 supervisors, and 277 non-supervisory professionals in 10 well-managed firms with extensive research facilities.

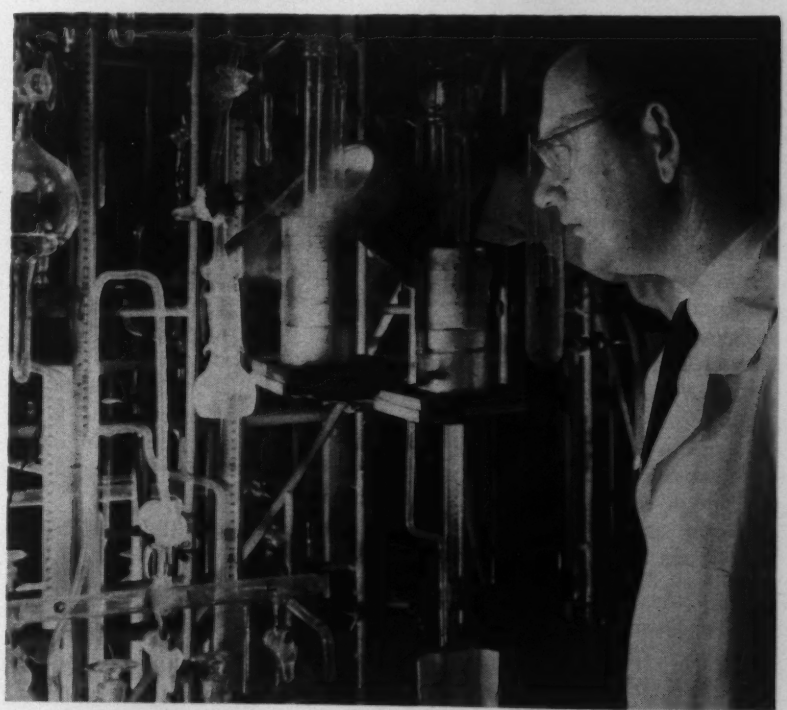
The companies include four which produce and/or distribute chemicals; two are in the electronics field; two make automobiles and related metal products; and two are electric light and power companies.

A Group Apart—Today, engineers and scientists are regarded by management as a group apart within the business organization. And these professional employees think of themselves in just about the same terms. Consequently, they don't respond well to many traditional management practices.

Dr. Danielson notes they are "college - educated and money-minded." At the same time, they are often unlike their bosses both in training and motivation. They are interested in their work, but a job well done is no longer its own reward.

The U. of M. researcher says: "Many who enter these professions today seek to satisfy a 'self' motive. For instance, their primary satisfaction may be gaining personal advancement and recognition. Crusading and serving still exist, but to a lesser degree in many cases.

Means to an End—"Instead of the technical and scientific training's leading to increased technical contribution, it serves as a means to an end. Many follow engineering programs only so they'll be more employable. Once employed, they



CHANGING VALUES: While scientists and engineers are intensely interested in their work, they require different rewards today. A job well done often isn't enough. (Olin Mathieson Corp. photo.)

"Many who enter these professions today seek to satisfy a 'self' motive . . ."

actively seek to move out of the technical areas and into more lucrative ones such as management and sales."

Management is at least partially to blame for this. It often fails to provide a route for advancement in the professions in industry. Regular personnel procedures fail to cope with the problems of dealing with individual professional abilities. Applications merely show standard information — schooling, majors, degrees, etc. Reference is seldom made to special areas of ability.

As a result, when new areas of responsibility or new jobs open up, they tend to be filled on someone's personal knowledge of the individual. There's no broad search through the organization to find the best man.

Adjustment Problems—For their own part, engineers and scientists appear to enter industry with a short-term perspective. They want recognition of their abilities immediately.

In the case of young engineers and scientists, this often conflicts with management practice to assign them to more routine jobs.

Both supervisors and non-supervisors agree one of the biggest problems facing young professionals is adjusting to a company's goals, standards and pace. Next in importance is learning the company system—how it does things. Supervisors also feel compensation in early years is often inadequate. And the rate of advancement and salary increases is considered a major problem in this area.

Split the Blame? — Comments one supervisor: "I think their big problem is that they feel their advancement will be slow. I think this seems to be a general problem around here. Some of this comes from the fact that they get the impression in school that they're going to shoot ahead fast. They don't learn in school that, in general, engineers, like everybody else, have a few rough spots to get over when they graduate."

But Dr. Danielson believes management is partially to blame for the current emphasis given salaries by scientists and engineers. He points out that company advertising and their recruiter's sales pitch often emphasizes financial advantages, such as starting salaries, fringe benefits, and payment of moving expenses.

"Consequently, the number of people attracted or guided, particularly by parents, into these professions has increased. Their motivations, attitudes and expectations are quite different from those of the men and women who entered these professions in the past," he says.

Prestige and Money—"Many are attracted to the sciences because of the monetary and prestige lure, rather than a devotion to fundamental knowledge. No longer does the scientist have to limit himself to employment in an academic institution. He can be well paid for full-time research work with up-to-date facilities and equipment, and see the immediate application of his results."

It's up to management to make a greater effort to explain the reasoning behind salary schedules to professional employes, the U. of M. researcher says. And it should improve methods for appraising their performance.

He also suggests consideration be given to possible new routes for their advancements. For example, some firms might do better to base promotions on technical ability rather than the administrative chain.

Reward Supervisors—Some supervisors, he adds, may be reluctant to advance their best subordinates or to have them transferred to other departments. This is because the supervisor's work is often appraised in terms of his own department's output.

He suggests this can be altered by rewarding supervisors who develop subordinates. Also, in selecting supervisors, consideration should be given to their interest in the company as a whole.

How They Rate—While money and advancement loom as the largest areas of misunderstanding between management and professional employes, they aren't the only ones. Most engineers and scientists rate themselves as more ambitious, creative, analytical, introverted, and emotional than other employes.

They also consider themselves to be more responsible and objective. And they feel they put more into their jobs, thus expect to get more out of them. They feel they are more individualistic and tend to resist regimentation. As a consequence, they want more freedom. And they want more "individual" supervision.

Likes and Dislikes—And they dislike routine assignments — designing, drafting, continuous tasks. They dislike "clerical" work even more — record-keeping, bookkeeping, etc. Making reports—written or oral—is also a distasteful chore. Reaction ranges from an outright fear of dismissal as being a wasteful time consumer. Many complain they aren't equipped to write reports, and that they receive no assistance from qualified persons with the proper educational background.

But Dr. Danielson finds there are a number of areas in which engineers and scientists do receive satisfaction from their job activities. Generally, they like seeing the results of their efforts. They get satisfaction from completing tasks.

They're stimulated by new, nonroutine, challenging assignments that tax their ingenuity. And finally, they obtain personal satisfaction from their work as well as recognition from other people.

How Will Kaiser Plan Work Out?

Tripartite Group Seeks Way to Steel Labor Peace

■ The three-pronged committee looking for peace and common sense in collective bargaining between Kaiser Steel and the United Steelworkers made known their ground rules last week in New York.

If these ambitious goals are only partly reached, the company, union and public members will be making history in industrial relations.

Profit Sharing not Foremost—Contrary to some opinion, the committee setup under the Kaiser-USW contract is not mainly interested in sharing the profits. The program now being put into motion covers a variety of problems. An outstanding point is investigating the whole problem of communication between the company and the employees.

In mentioning communications, Dr. George Taylor, chairman of the tripartite committee (and head of the President's panel in the recent steel labor dispute) said they were not interested in the mechanics of communication as such. The big idea was the substance of what was to be communicated.

A new twist to this problem went something like this: The committee is going to explore the question of why can't the employees get the same kind of information on the company as does the board of directors.

Will it "Rub Off" — Edgar F. Kaiser, chairman of the board of Kaiser Steel was pleasantly overwhelmed by the fast and friendly launching of the work by the company, union, and public members. Apparently meeting major problems without a strike deadline, without White House pressure and with the general idea of exploration foremost, is a new and welcome pitch.

USW president Dave McDonald, in an aside, said he hoped for considerable progress which would "rub off some on other members of the steel industry."

ALL SMILES: Kaiser Steel's labor-management committee is optimistic at first meeting. General objectives and plan of action are charted.*

Feeling of Optimism—Dr. Taylor was quite optimistic. He was not ready to make any predictions. But in view of his horrible experiences in the steel strike hassle (horrible from a standpoint of getting anywhere with mediation) he can be expected to do his best to make a good thing out of the company-union-public setup.

Points of Study—Here are some of the major problems which the tripartite committee will explore, study and make recommendations on:

A study of actual experience with methods changes.

Review of entire grievance machinery to find out what, if any, changes for the good can be made.

Widen the area of communications with emphasis on the content and not the machinery.

How the company and union can better understand future planning.

Complete study of incentive plan in light of the major changes in technology.

An attempt to see if a new procedure can be set up to prevent strikes.

Study of a method for sharing the economic benefits of the company with employees.

If last week's meeting is any criterion, even of goals, there is a distinct chance that the steel industry will, sooner or later, be affected by the Kaiser-labor-public committee—even though the Kaiser Company left the "club" last year and made its own agreement.

—Tom Campbell

*Standing, left to right, Howard Hague, vice president, USWA; David Cole, public member; C. F. Borden, executive vice president, Kaiser Steel; John Dunlop, public member; E. E. Trefethen, vice chairman, Kaiser Steel; C. J. Smith, Director, Dist. 38, USWA. Seated, from left, Edgar F. Kaiser, chairman, Kaiser Steel; David J. McDonald, president, USWA; Dr. George Taylor, chairman of tripartite committee.

Japanese Push Sales in Midwest

All-Out Drive for More Orders Begins

Japanese steelmakers are moving into the Midwest in force, setting up sales offices.

Service centers are one of their prime sales targets.

With increases in Japanese steel capacity, more exports to the U. S. can be expected.—By K. W. Bennett.

▪ Japanese steelmakers are going all-out to capture large markets in the Midwest.

Following market analysis, two Japanese steel companies have opened sales offices there. Three others are expected to follow suit in the near future.

The companies now operating sales outlets are Sumitomo Shoji Kaisha, Ltd. and Mitsui, Ltd. Those expected are Mitsubishi Shoji Kaisha, Ltd., C. Itoh & Co., and Nichimen Co., Ltd.

Wide-Range Interests—Two Japanese shipping lines say they will take on or discharge cargoes at Chicago during the 1960 shipping season. And sales representatives for the steelmakers are scouting markets in the Milwaukee area.

The products offered are cold-rolled and silicon sheet, stainless, and alloy steels. A Chicago service center is now slitting a 1500 ton order of Japanese cold-rolled sheet.

Aim at Warehouses—The warehouses are prime sales targets for the Japanese marketers, searching for distributors who'll stock the material on a year-around basis. Trade reports indicate several potential distributors are looking at the idea with interest. A midwestern seller of Japanese aluminum sheet reports, "We've had no complaints on the material in three years, and we've figured on a long-term average mark-down of 4-5 cents a lb under domestic price."

Japanese imports to the U. S. in 1959 were 624,342 tons. The biggest single tonnage item was reinforcing bars. Other products imported in heavy tonnages were wire, rods, nails, plates, sheets, and strip.

The Japanese admit they are seeking Western markets. Red China has proven a difficult business prospect. At the same time, Red Chinese goods are slicing into Japanese markets in the southern Orient. The Japanese hope a stable export market will level the elevator ups and downs of domestic prices.

Production Plans—Japanese steel output will climb in the next few years. Yawata Iron & Steel, producer of 25 pct of Japanese output in 1958, plans to expand from a 3.4 million ton capacity last year to 4.5 million tons in 1962. Fuji Iron & Steel, scheduled to hit 2.7 million tons last year, is aiming at 3.8 million tons in 1962.

Nippon Kokan expects 2.3 million tons in 1962, and 3.1 million tons in 1966. Sumitomo Metal Industries hit 787,000 tons in 1957 and will aim for 1.5 million tons by 1963. Japanese Ministry of International Trade estimates put steel capacity at 19-20 million tons by 1962. At least 25 pct of this capacity is expected to be in oxygen converters.

Flexible Prices — How tough is Japanese competition? The Japanese have occasionally been priced out of their own home market, as recently as 1957. They point out they have one of the world's most modern steel industries. The basic wage for a steelworker, though Japan's highest, is about $20 a week.

But steel wages in Japan have trebled since 1949 and are still going up. So have steel prices. Despite the new mills, Japan has, in the past, imported 48-50 pct of its coking coal, 86 pct of ore needs, and 20-30

OUTWARD BOUND: More iron ore is leaving the U. S. in ships like the Nikko Maru (foreground) to feed Japanese steel mills. And more steel products are returning to the U. S. from Japan. In the Midwest, Japanese are opening sales offices in drive for orders.

pct of scrap requirements. The U. S. has been a major supplier of scrap and coking coal.

Market Plans—Japanese market philosophy seems to run like this: Export steel is regarded as a means of stabilizing home steel production. When demand in Japan falls every effort will be made to step up export sales. Judging by pricing in 1958 and 1959, prices will move up and down with demand.

Published Japanese mill base prices give a lot of leeway to trading companies which market the steel.

The major problem for U. S. competitors is keeping an eye on a price structure that, in the past at least, moves very rapidly.

Up, Then Down—The big question: How about steel price? Early this year Japanese prices on cold-rolled sheet at New York were as much as 25 pct over U. S. domestic prices. Rebars began 1959 at $92 a ton, finished the year at $125 a ton.

Veteran import steel brokers report prices have dropped $5 to $6 per ton recently. They expect a drop that will amount to another $10 to $20 per ton by the early third quarter. If Japan's domestic demand fails, the decline could be deeper.

Flexibility of Japanese steel prices seems to bother the Japanese as much as it does their competitors. For instance: In 1951, the Japanese government discontinued subsidies to the steel industry. But prices shot from $81 a ton in January to $136 in nine months.

Dual Pricing—In 1955 the bar price steadied at $97 per ton, but climbed to $137.50 by early 1957. Light plate rose from $111 to $157 in the same period. Yet, to earn foreign exchange, Japanese steel was offered in the export market during 1956 at 30 to 40 pct under Japan's domestic price.

During 1958, when the country's government tightened credit to halt what appeared to be a runaway boom, prices fell. Breakoff of the trade effort with Red China compounded the price drop.

Steel Founders Keep Sales Optimism

Confidence that 1960 sales will be good was in evidence at the Steel Founders' Society annual meeting.

But the industry knows it faces tough marketing problems. Two are the rising tide of imports and pressures on costs.

▪ Steel founders haven't lost their optimism about 1960 sales. But they realize there are some tough market problems that need attention.

Gathered in Chicago last week for their annual meeting, members of the Steel Founders' Society of America took a close look at their market.

Ten Pct Gain?—Industry spokesmen predicted a 10 pct sales gain this year over last year. This would mean shipments of 1,375,000 in 1960, compared with 1,250,000 in 1959.

So far this year, steel foundry shipments have held up well. First reports on February tonnages showed gains in castings shipments. The rebound came after a sharp fall-off during the 1959 steel strike period.

Railroad car builders—an important castings market — left the market then. But they're back now. Continued freight car building should increase foundry backlogs by May. Right now steel founders say backlogs are holding about even, either gaining nor falling.

Import Troubles — There are, however, some marketing problems the industry must battle. One is the rising tide of imported castings, selling at below U. S. prices. The founders report Belgian, German, and Italian castings are already moving into this country. Prices are as much as 30 to 50 pct under U. S. price levels, according to one estimate. It was reported, for example, that a machined casting order was delivered to a U. S. buyer at 25 pct under the U. S. rough casting price.

With Europe selling in the U. S. market, it's reported Japanese steel castings producers are eyeing sales in this country and making some tentative offers. At least some Japanese produced material is already being marketed here, though no price information is available.

Cost-Cutting Drive — Steel founders are keenly aware of the import threat, and eager to meet it. One researcher points out that U. S. steel foundries pour 22 tons of castings per man per year. Every 22 tons imported, they point out, eliminates one man's job.

Upshot of the import problem: An all-out fight to cut costs. To do this, foundrymen are sticking to heavy capital input, intensive management overhaul programs and streamlined costing programs. The conclusion that they aren't talking much about, but privately admit: They'll put up the toughest fight of their lives in coming wage bargaining sessions. Commented one: "We have no choice. Either we fight, or we quit."

Labor Talks—With what could be the beginning of a mild price battle on their hands, the steel founders face an initial round of wage negotiations that will hit hardest in May and June. A second lot of new labor contracts for the industry are due for rewriting in September.

A third problem: U. S. produced steel castings take longer to wear out. With a constant increase in production of high-quality, heat treated castings, some castings have a life expectancy of as much as 30 years.

Why More Reliability Is Needed

Missile and Defense Demands Are Critical

Reliability engineering has evolved from conventional test procedures to meet the needs of space-age developments.

Here are some ideas on what it is and how it can be used.— By T. M. Rohan.

▪ The problems and potentials of a new style "reliability engineer" were outlined at the 17th Annual Machine Design Conference of the Cleveland Engineering Society last week. Engineers were also told to expect new materials, such as transparent metals, in the years ahead.

Reliability engineering has evolved from conventional test procedures in late years. It has reached its highest point in missiles and defense systems where it is most critical.

Need Is Critical—R. C. Landers, chief of the reliability office of Thompson - Ramo - Woolridge Co., Cleveland, says need for reliability is critical. And he offers a few horrible examples: A recent Navy survey of electronic gear shows it inoperative 66 pct of the time; about 75 pct of Army electronic gear is out of commission or under repair at a given moment; and in the Air Force, cost of maintenance of electronic gear in 5 years runs 10 times the original cost.

Reliability testing, he points out, now includes in its environmental analysis the new factors of electromagnetic fields and deterioration from nuclear radiation. He strongly recommends more reliability data on new hardware be circulated to design engineers to get them out of the rut of specifying the same old favorite parts.

Data should include derating curves, failure rates and application pitfalls. Design and specification check lists should also be used and formal design review boards set up. Reliability support function should include operations research, value analysis, logistics engineering and statistical design of experiments.

"Don't feel it's an admission of inadequacy to call on a reliability engineer," he adds.

A "Wanted" List — A self-style "exploration" into possible future scientific developments gained quite a bit of altitude. W. A. Ayres, director of technical-economic research of Designers for Industry, Inc., of Cleveland said that in the field of materials, many new types can be invented.

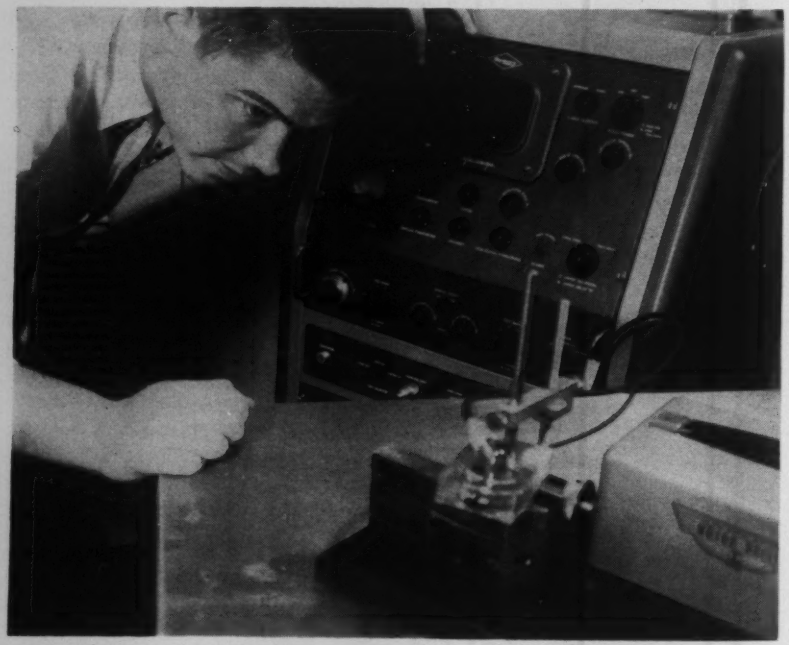
He mentioned: transparent metals; cellular metals with higher strength - to - weight ratios; and broader melting range metals for better molding properties. Other improvements are necessary in better crystalline-structure glass for more impact strength; flexible magnetic materials; and solids with lower coefficient of friction for less wear and lower power needs.

Also needed, according to Mr. Ayres, are better electrical conductivity than copper and silver, and better insulation.

Invention Exhibit — The society will sponsor a National Inventions Conference and Exhibition, June 20-24. Inventors will get a chance to show their developments to manufacturers and investors.

D. H. Cornish, executive director, notes that for competitive reasons both companies and inventors are often wary of showing their inventions. But the society hopes to bring the groups together.

The Inventions Conference group should have exhibits by April 1. It is headed by J. H. Gepfert, Reliance Electric and Engineering Co., Cleveland.



INSURING RELIABILITY: A reliability tool at Caterpillar Tractor Co. is this ultrasonic testing device. It's used to check the soundness of a weld, detect internal defects, inclusions, and cracks.

Commerce Dept. Holds Machine Tool Hearings

The American machine tool industry can do better than its present $145 million export business, representatives of the industry say.

In a conference on export trade, arranged by the Dept. of Commerce, the industrialists said export volume can be expanded by the easing of some restrictions imposed by foreign governments.

Maximum Assistance—The conference was the second in a series which Commerce is holding to get views of industry generally on steps the government might take to give maximum assistance to American private industry and trade to increase sales of U. S. products abroad.

Quotas and licensing in Europe were among the trade handicaps listed. Import taxes imposed in addition to tariffs constitute a growing problem in some quarters, the tool men say. They agree, however, that the big factor preventing sales by U. S. industry is the price advantage held by foreign competitors.

Special Tools — This has hurt exports of general machine tools, they maintain. And the result is that most export business is done in special tools requiring the most advanced technology.

The data on tariff restrictions being gathered in the hearings is expected to be particularly important to American negotiators when tariff negotiations begin at Geneva, Switzerland this fall.

The Participants—Taking part in the Commerce conference were: Rudolph Bannow, Bridgeport Machines Co.; F. A. Brandes, Lehman-Brandes Machine Co.; Nelson F. Caldwell, Amertool Services, Inc.; Eugene C. Clark, Jr., Chambersburg Engineering Co.; Noble B. Clark, The Warner & Swasey Co.; Charles W. Doepke. The G. A. Gray Co., and Everett M. Hicks, The Norton Co.

Also: J. Robert Jones, Kearney & Trecker Co.; Ludlow King, National Machine Tool Builders Assn.; Alan C. Mattison, Mattison Machine Works; William Moeser, Jones & Lamson Machine Co.; William E. Rutz, Giddings & Lewis Machine Tool Co.; T. Lawrence Strimple, National Acme Co.; Melvin Stone, Machine Affiliates, Inc.; B. C. Webster, Jr., The Bullard Co., and Spence Wright, Ex-Cell-O Corp.

High Winds, Cold Predicted

GETTING READY: This five ton bulkhead assembly gets final machining at Dravo Corp.'s Neville Island, Pa., plant. The 20 ft diam structural steel bulkhead will be installed in a test cell designed to test jet and rocket engines under high-speed, high-altitude conditions.

Republic Planning More Expansion

An additional $26 million expansion of Republic Steel Corp.'s Cleveland works is in the making. This is in addition to the firm's more than $159 million 1960 capital spending program announced last week in The IRON AGE.

Right now overcrowding of space in the area has snagged the present plan. The firm has offered to split the cost with the city of culverting a small creek which now runs through the property.

Under Advisement — Estimated cost of the project is $1.5 million and the city has taken the proposal under advisement.

Specific expansion in Cleveland proposed by Republic's president, Thomas F. Patton, includes replacement of coal preparation facilities, modernization of benzol refining facilities, installation of an elevated approach track and improvements to a billet and bar mill.

Ready for Spring

Reynolds Metals Co. has begun baking out the second of the three potlines at its new St. Lawrence reduction plant at Massena, N. Y., for start-up about April 1.

AN IRON AGE SPECIAL REPORT TO MANAGEMENT

Small Suppliers Face a Big Job

By Z. S. Malinowski and W. N. Kinnard, Jr.

Small firms supplying the metalworking industry face a host of problems in trying to stay in business.

Most firms are small and many problems are unavoidable because of the nature of their operations.

▪ There are at least 22,000 small plants in the U. S. supplying parts and components to the major metalworking companies.

These small companies cluster around the large centers of production and the industries they serve. They are, in a sense, a satellite industry.

One Man Management—Almost all of these firms are small, employing fewer than 50 workers. The owners themselves undertake all aspects of management. Because of their extreme dependence on subcontracts and custom jobs, these firms form a highly volatile complex, with common, peculiar problems.

These problems call for attention, since the importance of these firms in our economy cannot be measured solely in terms of dollar value. There is an interdependency between service firms and the prime contractors.

Bottlenecks in production can be made or broken by their collective efficiency or inefficiency. The importance of these firms is dramatized in time of war. In these days of hot peace, their economic health and stability are highly desirable.

Hand in Hand — Many of the problems of the small supplier are inherent in the very nature of the business — the short term, dependence on a limited number of customers to cite some examples.

Others are management problems. These are principally the result of the fact that the owner and manager is usually the same person.

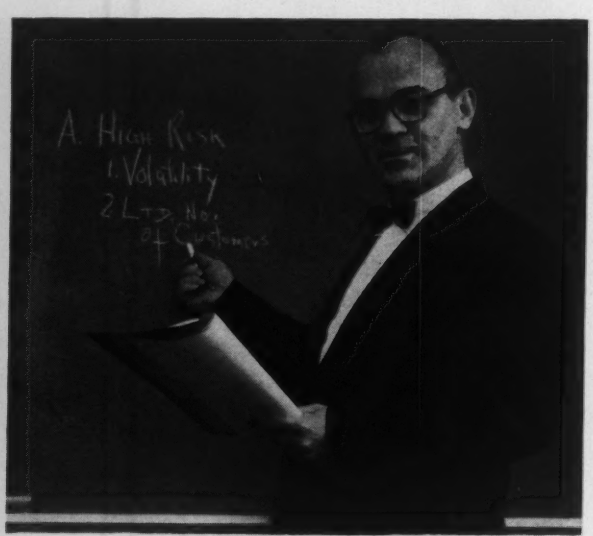
Part I of this series deals with the problems that are characteristic of the business. Part II will cover the problems of management.

Next Week:

Management Problems

Part II of this special study of the small suppliers will cover the problems of management. It points out how and why they suffer from undermanagement; analyzes the specific problems stemming from owner-management.

W. N. KINNARD, JR.: Professor of finance and real estate, head of Business Dept., School of Business Administration, University of Connecticut.



Z. S. MALINOWSKI: Associate professor of marketing, School of Business Administration, University of Connecticut.

Principal Asset — One predominant characteristic of the small supplier is its high flexibility and technical know-how. This is the small supplier's principal asset—in fact, its justification for existence.

Other characteristics sound like a list of problems. They include: High risk; preoccupation with the short run; competitive problems; shortage of highly skilled labor; inadequate financing; and high fixed assets.

High Mortality Rate — Most of the problems of the job shop either stem from or are closely related to the industry's riskiness. This is evidenced in the high cyclical mortality of these firms. In Connecticut, between 1955 and 1957, 22 pct of the failures of manufacturing firms were in this category.

The high risk results from these factors:

- 1. Extreme volatility of demand and income.
- 2. Limited number of customers.
- 3. Limited number of products.
- 4. Dependence on one man.
- 5. Undermanagement.

Work and Income—The extreme volatility of demand and income is not surprising since these firms depend upon industries that themselves are volatile.

They include automotive, aircraft, industrial machinery, machine tools, and defense products. All of these are subject to wide variations of production. The instability of the group is aggravated by the recession practice of the customers of first, pruning the list of firms from which they request bids, and, second, retrenching.

No Contracts—In slow times, the prime contractors themselves do much of the work which they subcontract in good times.

These small suppliers also show much greater extremes of profit and loss than do larger firms.

Says one screw machine manufacturer:

"We are very cyclical. The screw machine products industry runs on a four-year cycle and has for the last 20 years. In this industry, the average does not mean much. Your productivity, efficiency, and profit depend upon your own individual ingenuity and effort. This is a business where your ability to tool a job successfully and get it to run efficiently is the key to making money."

Too Few Customers — The limited number of customers dominates the small supplier's business. One machine shop was brought to a virtual standstill by the loss of the business of one firm. A study of foundries in the Baltimore area revealed that, on the average, each foundry's single, most important buyer took more than half of its total output. Concentration of sales ranged from a high of 95 pct in a single customer to a low of 59 pct.

Many metals service firms do nothing but special custom jobs for large manufacturers. And almost all firms report they would like at least one product which was not custom-built, but had a different enough and broad enough market to help fill the gaps left by slumps of their major customers.

Lacking Capital—There are two factors contributing to this precarious position. First, the companies cannot undertake the costly research and development which is essential to stability.

Second, they are often unable to take advantage of the new product developments of others because of limitations of capacity, marketing capacity, and equity capital.

The Short Run—The small shops tend to be preoccupied with the short run. Many small shop owners are not concerned with writing off machinery over a period of 10 to 20 years for a better tax situation. The risks are too great for worry beyond the immediate years, or, in recessions, beyond immediate days.

This preoccupation is also fos-

Small Supplier Characteristics

Do These Points Strike Home?

1. High risk, resulting from extreme volatility of demand and income. Limited number of customers, limited number of products, dependence on one man, and undermanagement.

2. Questionable marketability of shares of ownership resulting from the high risk and contributory factors.

3. Irregular accounting concepts and practices stemming from the close identification of the owner and the firm as well as from inadequate records.

4. Undermanagement resulting from assumption of most managerial functions by one or two men.

5. Preoccupation with the short run due to the high risk and the custom jobbing which predominates.

6. Competitive problems because of personal factors and the differentiation afforded by service and quality.

7. Shortage of skilled labor due partly to the volatility of the industry.

8. Intimate relationships which stem from the importance of service in a local customer-oriented market.

9. Inadequate financial arrangements, especially for long-term funds.

10. High flexibility, made possible by the small size of the company and technical competence of the owner.

11. Heavy fixed - assets together with rapid obsolescence of machinery.

About the Survey

In compiling the data of this survey, Doctors Malinowski and Kinnard relied on a "depth" approach in a series of detailed personal interviews.

They went into the shops, talked with owner-managers. They met with association officers and others who deal daily with the small metalworking supplier—the purchasing agent, the bank, the industrial engineer, for example.

Because of proximity, and because it is a typical industrial area with its "satellite" small suppliers, most of the interviews were conducted in the Hartford metropolitan area.

The study does not set forth any program to foster stability for the small supplier. But it does expose and review the peculiar problems and characteristics of the firms and their owners.

The belief is that from this study, insight can be gained as a base for possible legislative, administrative or advisory programs.

tered by the custom jobbing of short-run work to which these firms largely limit themselves. Their technical background causes most owner-operators to be interested in immediate production problems. They become preoccupied with daily problems and develop an inertia—an inability to think beyond the short-term.

Tough Competition—By the nature of their business, the small suppliers face many competitive difficulties. Most work is acquired through bidding. Getting on bid lists is often difficult and requires close personal contacts. Courting the favor of purchasing agents is frequently necessary.

Direct sales efforts are usually restricted to the owners' personal activities and to manufacturers' agents.

During periods of depression or slump, price competition becomes quite keen. There is still product differentiation and quality and service competition, but price cutting at such times is often large and therefore more likely to overcome differences in quality and service.

Labor Problem — Highly skilled labor is necessary for the precision tool engineering in which most of these firms are involved. Usually, it is a selected few key employees who must have the highest type of technical skill for success of the firms.

There is difficulty in obtaining and holding metalworking craftsmen even in good times. And in bad times, many cannot afford to retain the highly skilled craftsmen. Expansion, which is possible during times of growing demand, is difficult because of a shortage of such workers.

Wage Costs High — Some plants find it difficult to retain craftsmen because security, fringe benefits, and middle and top management positions are generally better in larger firms. For this reason, many offer inducements in the form of built-in overtime, premium rates, or bonuses out of profit.

This helps make wages relatively high in the industry and labor costs constitute the largest segment of operating costs.

Headaches in Financing—Inadequate financial arrangements make up a continuing problem for the metals service plants.

Short-term funds are generally available in adequate supply, but not as readily as to larger, less specialized, and more stable firms. The terms are generally less favorable—more limited amounts, shorter maturities, higher interest rates, and more restrictive repayment requirements.

Long-term funds are limited. To some firms, they are unavailable on any terms. Retained earnings provide the most usual source of additional equity capital, but are limited and provide for slow growth only. Obtaining long-term loans is the major financial problem.

Outside Funds—In summary, outside investment funds are limited because of high risk, questionable marketability of shares of ownership, inadequate working capital, poor showings on balance sheets and income statements, reluctance to relinquish control, inadequate management, and insufficient owner's equity.

In common with many other manufacturers, metalworking's small suppliers, with their use of expensive machinery, have a fairly high ratio of fixed assets, especially as compared with retail and service.

With such expensive equipment and with the limited personal savings that go to initiate these companies, it is not surprising to find that the firm has to resort to second-hand machine tools and is often under-capitalized from the very beginning.

New Equipment—In order to attract new work and remain competitive in price and quality, the firm has to replace obsolete equipment; it has to modernize, rebuild, or convert.

The problem is particularly vexing in that even the simple replacement of worn-out machinery is difficult with the long-run inflation in machinery prices.

This problem has been aggravated in the past by limitations on accelerated depreciation of second-hand machinery. Some of the owners are very unhappy about depreciation allowances on new machinery also.

Recent changes in the tax laws have partially answered this objection, but it is still a problem.

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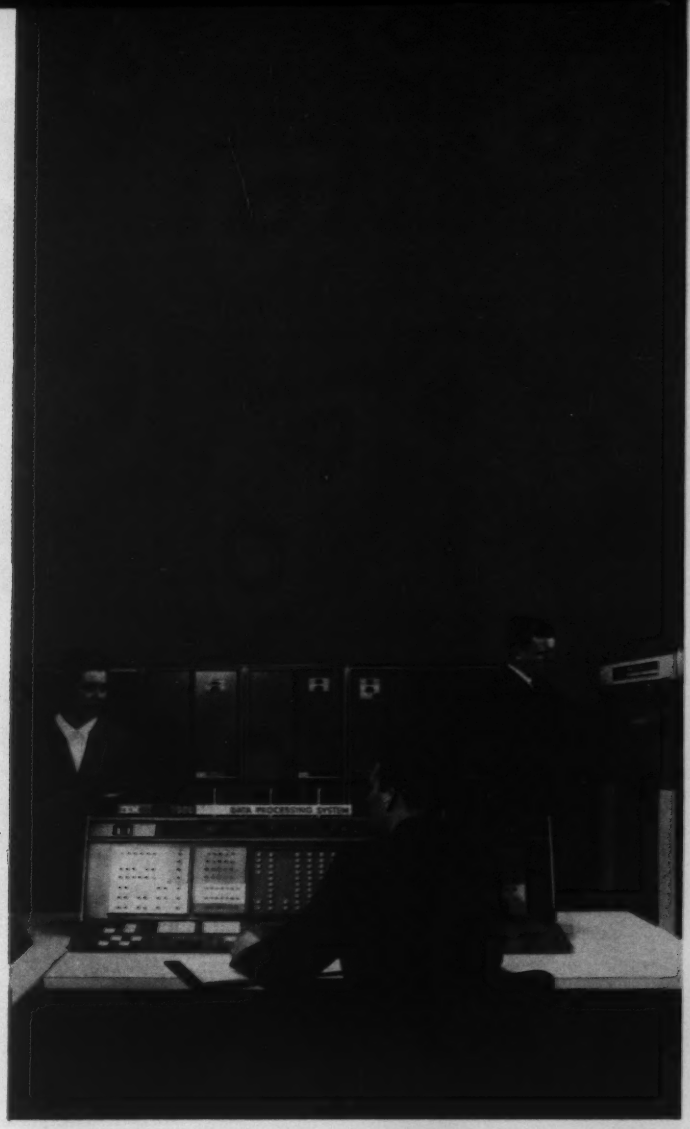

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Charles E. Rice

The Company's Balancing Force

When C. E. Rice took over as manager of sales 10 years ago the firm was hard pressed.

Under his conservative guidance, sales have increased and the company is no longer on the defensive saleswide.

■ At Jessop Steel Co., Washington, Pa., they think of Charles E. Rice as the realist and the conservative . . . the balancing force in an operation known for its dash and daring.

Jessop president Frank B. Rackley calls Mr. Rice "The great white father." Executive vice president and a director of the company, Mr. Rice makes no bones about his philosphy. "I'm a conservative man," he says.

Big, Fast Job—This quality has proved a great asset to Jessop. Faced with the need to do a big job in a hurry and manned by one of the youngest management teams in industry (average age under 45), the specialty steel company has needed a restraining hand at times.

"Without Charlie, this company could have made some bad mistakes," says an associate.

No Room for Wrong—There was little leeway for wrong moves when Mr. Rice moved up 10 years ago as Jessop's general manager of sales. The new management group, headed by Mr. Rackley, was then taking over a company that was living on a suspended death sentence. Jessop was backed against the wall and time was running out.

As sales chief, Mr. Rice faced three immediate problems. First, the morale of the field force had to be rebuilt. Secondly, confidence of customers had to be restored. Finally, service and quality standards had to be improved.

CHARLES E. RICE: "I'm a conservative man."

New Deal—The field force was called together. Salesmen were told a new deal was underway: That they could expect strong support from the plant and the home office. A communications program was started to give the field man a full account of management decisions.

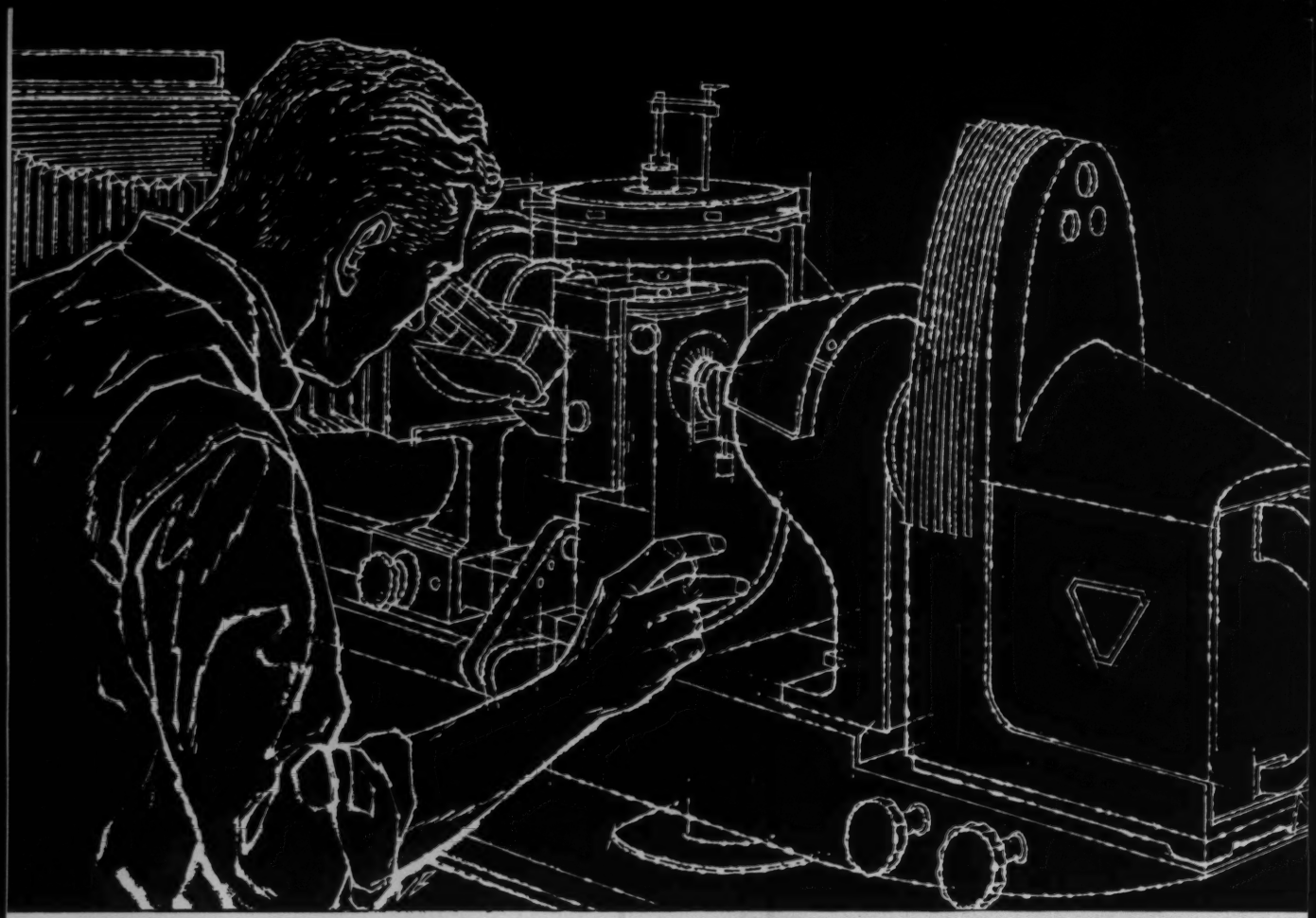
Customers were given a similar message. They were brought to Washington, Pa., and were shown the things that were being done to improve the plant. They were asked for business.

"We had to plead humbly for another chance," says Mr. Rice.

The Changes—These steps had to be backed up by improved service. New communications equipment was installed. A new system of order processing and follow up went into effect. The time for answering inquiries was cut from weeks to a few hours.

All these moves payed off in a sales operation that was tightened and strengthened and revived. In 1950, Jessop sales were $8 million. In 1959, sales were $48 million. The company has been taken off the defensive saleswise; it is now primed for growth and expansion.

Seven Day Week—Some of the credit for the improvement in spirit and service must go to the personal dedication of Mr. Rice. For over 10 years now he has been working a full seven day week. "When you want him on a Sunday, you call the plant, not his home," say salesmen.



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Long-Term Outlook Encouraging

When you get away from short-range doubts, the long-term outlook for business is promising.

New economic study shows how markets should expand in the next fifteen years.

▪ While everyone is concerned about the short-term outlook, maybe it's a good time to look at long-term business prospects.

When you do, the view is encouraging. What's probably ahead for the economy has been projected in a new report, "The Years Ahead: 1960 to 1975," a study just completed for the American Marietta Co., Chicago.

More Customers — The results show what you can expect in the way of expanding markets, research and development, and growth opportunities in the next fifteen years.

In that time your market potential will increase by leaps and bounds. According to the study, the U. S. economy will double by 1975. The number of customers will be one-third larger than today.

These buyers will be 50 pct richer than today's consumers. And the total purchasing power of families earning over $100,000 will equal today's entire consumer market.

Three Prime Reasons—What will make all this possible? Three factors will be important, American-Marietta points out. These are: Continued and rapid increase in population; construction activity which will dwarf the post-World War II building boom; large-scale technological progress.

Population growth will continue at high rates. Between 1960 and 1975, an increase of 55 million people is expected. This will mean four consumers in the market for every three today.

One area of major gain will be in the young adults—those between 18 and 24 years old. In this group are the young marrieds who now spend 27 pct more than the national average for autos and 75 pct more than the average for TV sets and furniture.

More Homes Needed—As a result of these population gains, more new homes will be needed. It's estimated that more houses will be built in the next 15 years than in the last 30 years. Suburban home building should account for $400 billion in construction. With the growth of the suburbs will come new shopping centers—an estimated 100,000 units are predicted.

But other types of building, including highways, will also increase. Industrial and business construction, estimated at $36 billion for 1960, may total $66.7 billion a year by 1970.

More Research — The third important force — technology — will also mushroom in the years ahead. Says the study, "In the next 15 years, American business and government will spend more than $250 billion just to discover and perfect new products and processes."

What Middle Managers Want

▪ What encouragement does a middle or supervisory manager expect from those above him?

His basic needs are outlined by Howard P. Mold, executive vice president, Streator Store Fixtures, Inc. Addressing a National Assn. of Manufacturers conference, he listed these wants:

The middle manager seeks economic security. He needs some ego buildup — especially through personal recognition and status symbols. He likes individual attention in the form of praise, approbation, and concern for him as a person.

Some Guidance—In addition, he needs group support, or a "sense of belonging." Within limits, he wants directional guidance in establishing goals and achieving them. He likes help in getting what he wants with a minimum of effort on his part.

Finally, there is a desire for a system or routine which will relieve him from the need to make decisions or accept real responsibilities.

Inventories Hit Peak In January

Business inventories, seasonally adjusted, increased about $1 billion in January, the U. S. Dept. of Commerce reports.

Most of the gain was in manufacturers' stocks which rose by $750 million. About one-fourth of the rise was in durable goods stocks.

The total value of inventories at the end of January was $90 billion. This was $5 billion above the same month a year ago. It was also greater than the previous peak, established last July.

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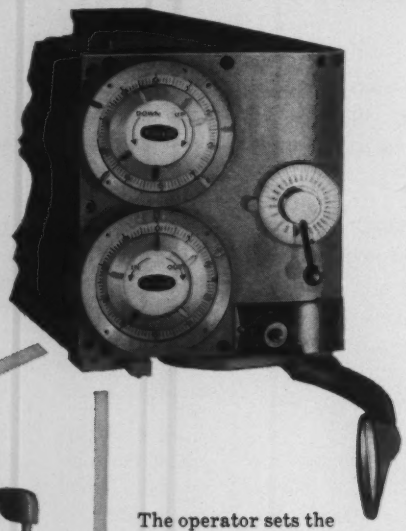
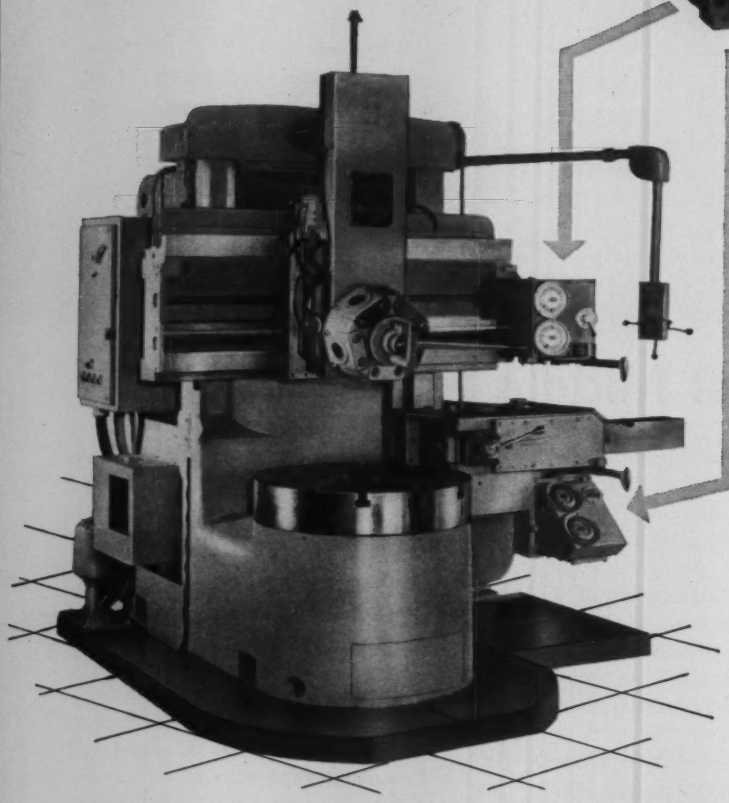
DYNATROL* V.T.L.

Obsoletes Handwheels

A completely new concept in measuring, utilizes large, easy to read, clock-type dials with dual pointers.





The operator sets the movable clips, around the dial, to conform with the workpiece requirements and by rotating the pointers to these settings he *knows* the tool is precisely located for the operation to be performed. The graduations and numerals remain stationary while the pointers rotate, one registering tenths of an inch and the other thousandths, for exact head positioning.

When coupled with the unique DYNATROL* control, this accurate measuring system eliminates the need for handwheels, for head-positioning, in either feed or traverse and increases the productive time of the machine.

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Compact Trucks Set to Roll

Ford's Falcon Ranchero Will Be on the Market March 30

Now the compact cars are solidly on the market, compact trucks are the next goal for automakers.

They'll cost less than foreign models and be cheaper to keep up, manufacturers say. — By A. E. Fleming.

▪ "Now that we've got our compact car successfully launched, let's see what we can do with a compact truck."

So observes a Ford Motor Co. official whose company will start selling the first of the Big Three's economy-size trucks on March 30.

What It's Like—Named the Falcon Ranchero, Ford's new pickup is a highly stylized commercial version of the Falcon car. Both have unitized bodies. Many parts are interchangeable, including the 6-cyl, 90 hp engine. Basic dimensions of the truck are: 189 in. long, 55.1 in. high; 60.6 in. wide, 109.5 in. wheelbase, 2435 lb curb weight and 800 lb hauling capacity.

Production began the first week in March at three plants—San Jose, Calif., Lorain, O., and Kansas City, Mo. Last week output, in the process of building up, was nearing the 1000-unit level, and will go higher as the month progresses.

The Other Two — How about General Motors and Chrysler Corp.? It doesn't look as if either will come up immediately with truck models of their Corvair and Valiant. However, there's supposed to be a Corvair delivery-type model set for fall introduction (Ford has built a prototype of a walk-in type truck, too), while Valiant officials claim, "We don't have anything coming up in the immediate future, but that doesn't mean something isn't in the wind." They caution, however, not to look for a Valiant truck "in the next few months."

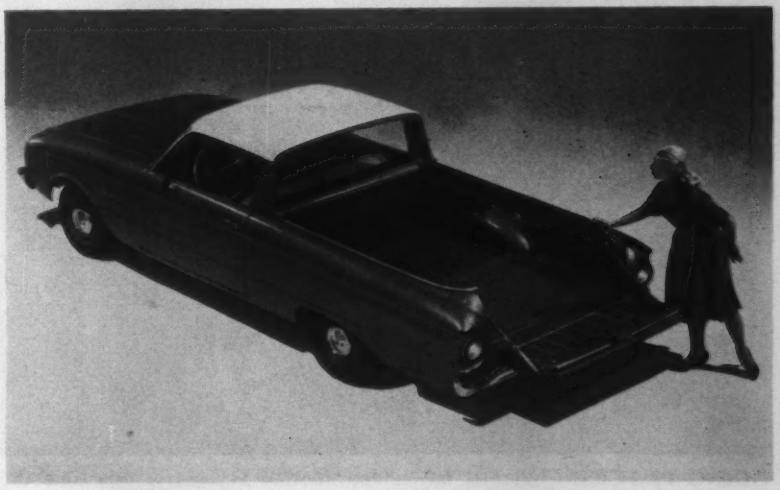
GMC Truck and Coach is coming out with an economy-size delivery van this month. And a company that doesn't build cars, International Harvester, has a pickup truck along the lines of the Falcon Ranchero in the works.

Metro-Mite — Its introduction date hasn't been determined. But IH is hot for this market, having enjoyed great success with a diminutive panel delivery truck called the Metro-Mite. It was introduced late in 1958 and more than 10,000 were turned out in 1959.

Why is a company like Ford interested in making small trucks? A mushrooming market for such models is one reason. Best evidence of this is seen in imported truck figures. Shipments of imports into U. S. ballooned to 21,763 units in 1959 from 15,330 in 1958 and less than 1000 annually in the years before 1955. The biggest share of these are small Volkswagen models from West Germany.

No Guessing—The Volkswagen pickup measures 169.3 in. long, weighs 2315 lb, has a payload capacity of 1875 lb and a 36 hp engine. It sells for $2034 in Detroit complete with all taxes and license. The Falcon Ranchero's suggested retail delivered price is $1862, including excise tax but not state and local taxes.

Will the American compact truck crash into the U. S. truck market as the compact car did the car market? Ford won't guess on this. But Ford truck marketing manager Wilbur Chase is betting it will attract many customers for several reasons. He lists them as: Lower initial purchase price, less costly tires, lower license fees, reduced



SMALL TRUCK: Ford's new Falcon Ranchero, the first compact truck to be made in the United States, will be on the market March 30. It has an 800 lb hauling capacity and features a six ft box.

insurance rates, greater gas and oil economy, less expensive body repair and lower loading height.

Lower Operating Costs—J. O. Wright, general manager of Ford Div., points to surveys that indicate about 20 pct of the pickup trucks in America never haul more than a 750 lb payload, while the average pickup truck is a half-ton model.

"This unused hauling capability means many businessmen are operating trucks with 20 to 25 pct greater hauling capacity than they'll ever need. So a substantial part of their annual truck operating cost is an unnecessary expense currently eating into their business profit margins."

The Farm Market—Farmers today buy 20 pct of all trucks sold in the U. S., and last year bought 161,000 trucks. About 35 pct of the pickup trucks in the U. S. are registered in farm communities. Prof. Roy Bainer, University of California, notes that over 20 pct of these trucks are operated at only 80 pct of their payload capacity, meaning there's a surplus of some 15 million lb of hauling capacity going unused by the farm market. Translated into actual trucks, this unused hauling capacity represents 15,000 half-ton pickup trucks and an investment of about $30 million in initial cost alone.

As for truck makers themselves, Ford officials view their small truck as a forerunner in a new era of truck design, during which more and more specialized trucks will be developed to meet individual job needs.

More Coming—"These continuing changes will influence truck makers to offer more imaginative new design concepts with broader power selection during the next decade than ever have been available," says W. C. Ford, Ford Motor Co. vice president of product planning and styling.

"We're working on a gas turbine engine that we expect will have commerical application. We've designed a Levacar to travel at extremely high speeds on a thin film of air, guided by rails. This too may have commercial application. In the years ahead," says Mr. Ford, "other designs will depart even more radically from trucking as we know it today."

There's Room at the Top

GOING PLACES: Chevrolet has added another accessory, this time the roof-top luggage carrier for the Corvair. Made of stainless steel, the carrier will accommodate up to 300 lb of baggage. It is installed by Chevrolet dealers as an option.

Studebaker-Packard Goes to Israel

Studebaker - Packard is taking large and rapid strides to become a world-wide auto maker.

A new agreement between Kaiser Fraser of Israel Ltd. and S-P will pave the way for Studebaker car and truck manufacturing and assembly in Israel.

Double Benefit—The pact is expected to benefit both the country and the company. While Israel gets cars and trucks suited to its needs, S-P gets a new market for vehicles.

Similar deals were recently made for assembly of Studebakers in Chile and Australia.

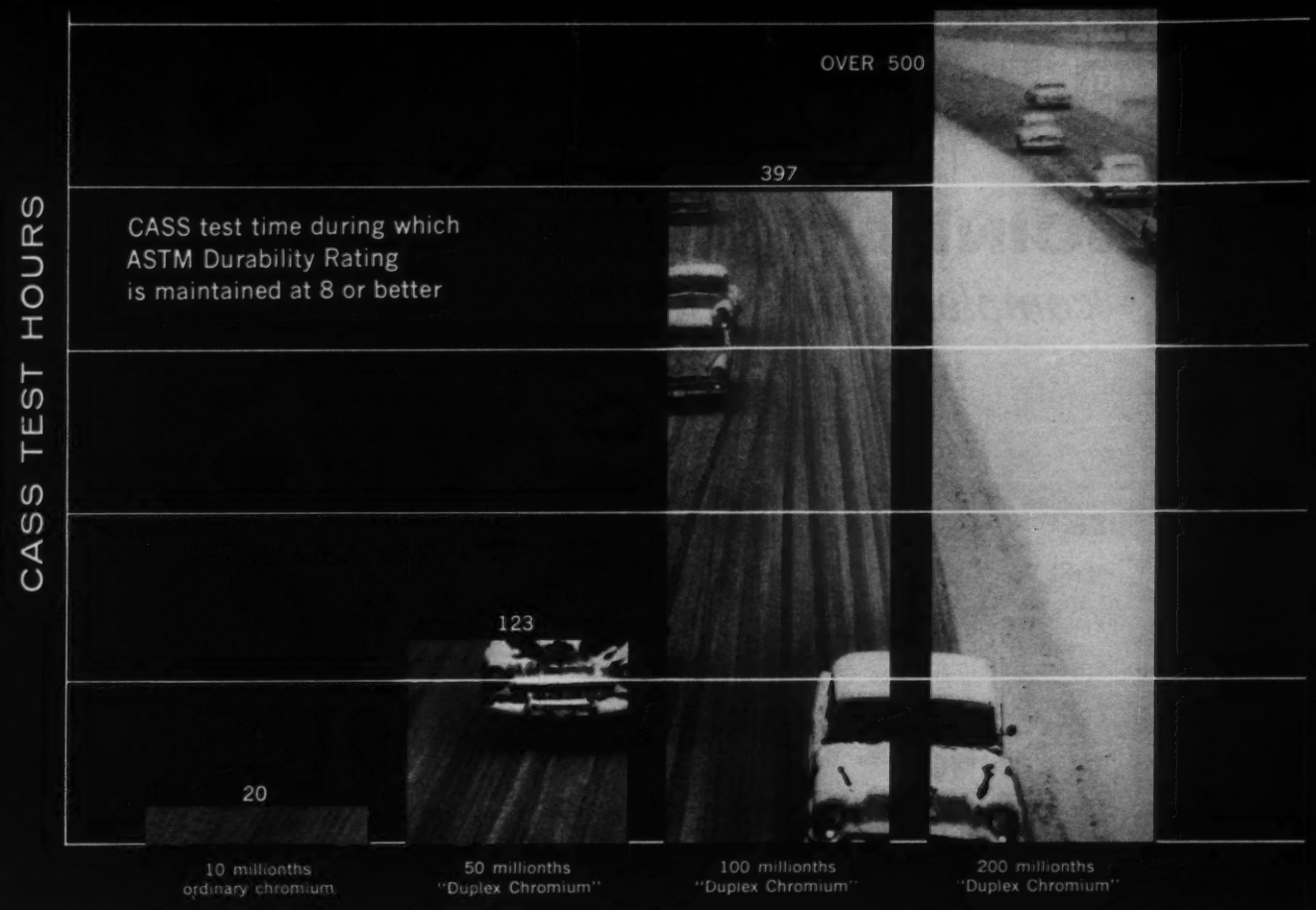
More Jeeps—Manufacturing will start in Kaiser Frazer's Haifa plant as soon as basic components arrive from South Bend, Ind., and pilot operations are completed. Production will reach an estimated 3000 to 5000 vehicles the first year. The plant will still make Jeeps, Jeep station wagons and small Jeep trucks along with Studebaker Larks, Hawks and trucks.

The Israel facilities, once used by Renault, provide a production capacity of 20 vehicles a day on one shift. The factory is the biggest in the Near East and the only one in Israel assembling and manufacturing cars and trucks.

Chevy's Confident

Not all automakers have backed-off from earlier predictions. Chevrolet general manager E. N. Cole insists "1960 will see sales in the area of 7 million cars and 1 million trucks. We believe our dealers will sell 1.8 million cars and 365,000 trucks."

The total of 2,165,000 units for Chevrolet would top its previous high year of 1955 when it sold just over 2 million units.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The thicker the "Duplex Chromium" ...the longer the plating lasts

You'll now do more to increase durability of plated parts with a little more chromium thickness properly applied than with any other change in plating specifications. Results with M&T "DUPLEX CHROMIUM" confirm this beyond all doubt. There's dramatic improvement with 50 millionths of an inch. With 100 millionths it's downright phenomenal . . . and with 200 millionths, you have the finish of the future.

The graph shows this clearly. These are results with zinc die castings plated with identical undercoats but with different chromium topcoats. See the difference M&T "DUPLEX CHROMIUM" makes in durability. Note that the thicker the chromium, the longer the service life expectancy. Corrodkote accelerated corrosion tests show the same pattern of protection and durability.

Experience shows that the only suitable way to plate thicker decorative chromium is with Unichrome SRHS® plating solutions. They make possible the correct *type* of deposit. They save production time. They simplify operations. And only with a combination of two of these baths can you produce M&T "DUPLEX CHROMIUM." Unichrome "Crack-Free" Chromium comes first, to block infiltration of corrosives to underlying metal. *Giving more uniform plate distribution,* this bath deposits ample thickness in recesses, with no graying on edges. A subsequent deposit of special Unichrome SRHS® Chromium then follows, to avoid localized corrosion at defects in the basis metal.

SRHS® baths and the "DUPLEX CHROMIUM" process can be adapted to most existing plating operations. Send for the M&T plating engineer to survey your plant requirements, or ask for literature.

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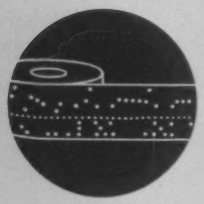

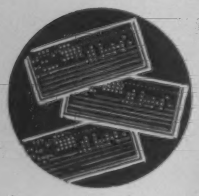

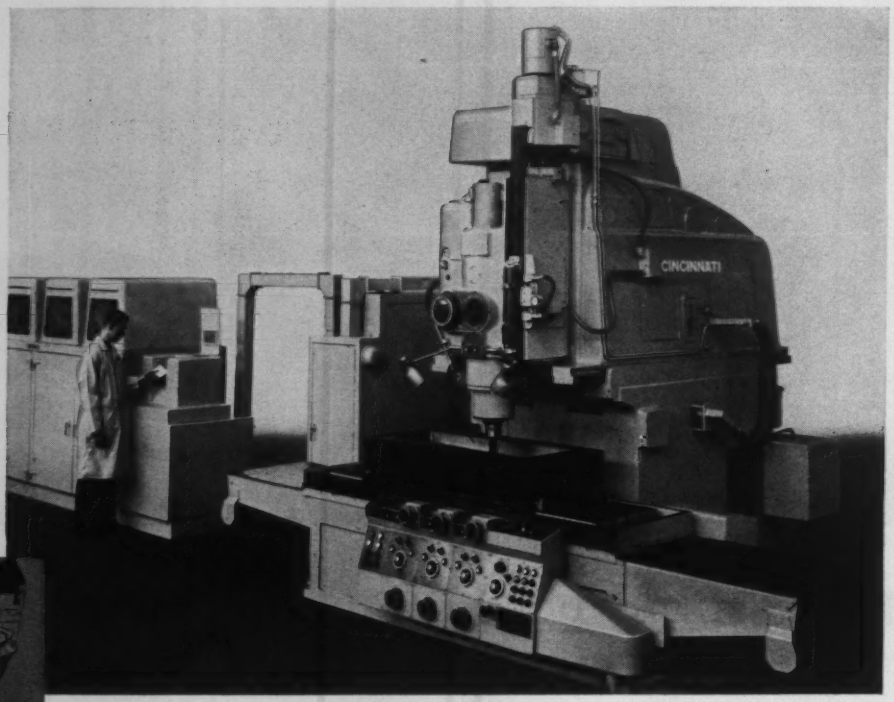

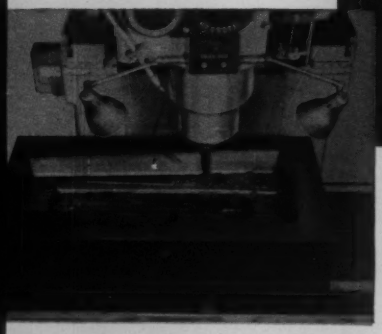

CINCINNATI 30" x 52" Vertical Hydro-Tel equipped with CINCINNATI ACRAMATIC 3-Axis contour control, performing a die sinking operation on a die for a milling machine motor compartment cover. ACRAMATIC's exclusive parabolic interpolation method programmed this entire complex operation using only 2000 punched cards for the twenty hours of machining required.

Here is a simplified numerical control system that brings to more and more shops the cost-saving benefits of this efficient manufacturing concept. This system realizes the full potential of numerical control because all its elements are completely coordinated from their inception under the single responsibility of The Cincinnati Milling Machine Co.—where numerical control specialists work hand in hand with machine tool designers, and application and methods engineers.

ACRAMATIC offers a number of practical advantages: *Simplified Contour Programming*, requiring less input data because of exclusive parabolic interpolation method. *Cutting Tool Compensation* permits change of cutters without change in programming. *Zero Shift Control* eliminates need for exact positioning of work on table. *Automatic Repositioning*—all dimensions are established from a single base point. *Feed Rate Override* allows manual adjustment of feeds below programmed rates. *Accuracy unaffected by varying line voltages*, because dimensions are represented by voltage ratios.

There are many other ways in which CINCINNATI ACRAMATIC takes full advantage of the possibilities of numerical control. Publication M-2125 contains details. May we send you a copy? **The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

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Steady Price Level Predicted

Few Increases Ahead for Balance of the Year

Government economists have changed their views on higher prices and predict a steady trend.

The big business boom expected isn't coming as people are holding onto their savings. —By G. H. Baker.

■ A steady price level is now likely for the balance of this year.

Only three months ago, government economists included warnings of higher prices in their forecasts of boom business in 1960.

Now, it is increasingly evident that prices—industrial and consumer—will continue on a plateau for at least the next three quarters.

Up and Down—The government experts warn that some prices may rise while others decline in the months ahead.

But the overall trend is toward stability.

It is now an open secret that many government experts were too optimistic in their December forecasts of 1960 business. Although boom forces are still at work, they're being diluted somewhat by heavy inventories. In addition, consumers are showing a strong tendency to hang on to their savings this year. Sales of new homes, cars and appliances are all below expectations.

One of the Steadiest—"It may be one of the steadiest years from the point of view of prices that we've experienced in many years," one government official said. Sales for some industries will move ahead, however, while some decline. Others will simply hold the line.

Sales of new cars, always a reliable weathervane of economic activity, are moving at a fair, but unspectacular rate. But it is painfully clear that auto production, especially in the early weeks of this year, was too high for the rate of sales. Further downward adjustment of factory production rates is inevitable, as the experts see it.

Some Changes—Commodity prices were virtually unchanged from early January through early March. Tires and farm equipment were marked up, but prices were marked down in rubber, wool, and several other key commodities. Steel and most industrial commodities held steady.

Softer prices in some lines definitely do not spell "recession." The emphasis for the next 9 to 12 months is now on "stability," with a very moderate overall gain in gross national product.

Time for Planning—Absence of inflation means that it's a good time to buy for the future. The climate for advance planning is favorable, in the sense that business for the balance of the year is more predictable than for several years. There are no major upsets — either on the plus side or the minus side—in sight.

There are signs that the Federal Reserve Board may be ready to loosen its tight rein on the money supply. Credit has been both hard to get and costly for six months now, and there is talk in government circles that some easing of money rates is now in the works. The first evidence of such a trend may well come in the form of lower average net borrowed reserves for commercial banks.

Help Coming for Small Firms?

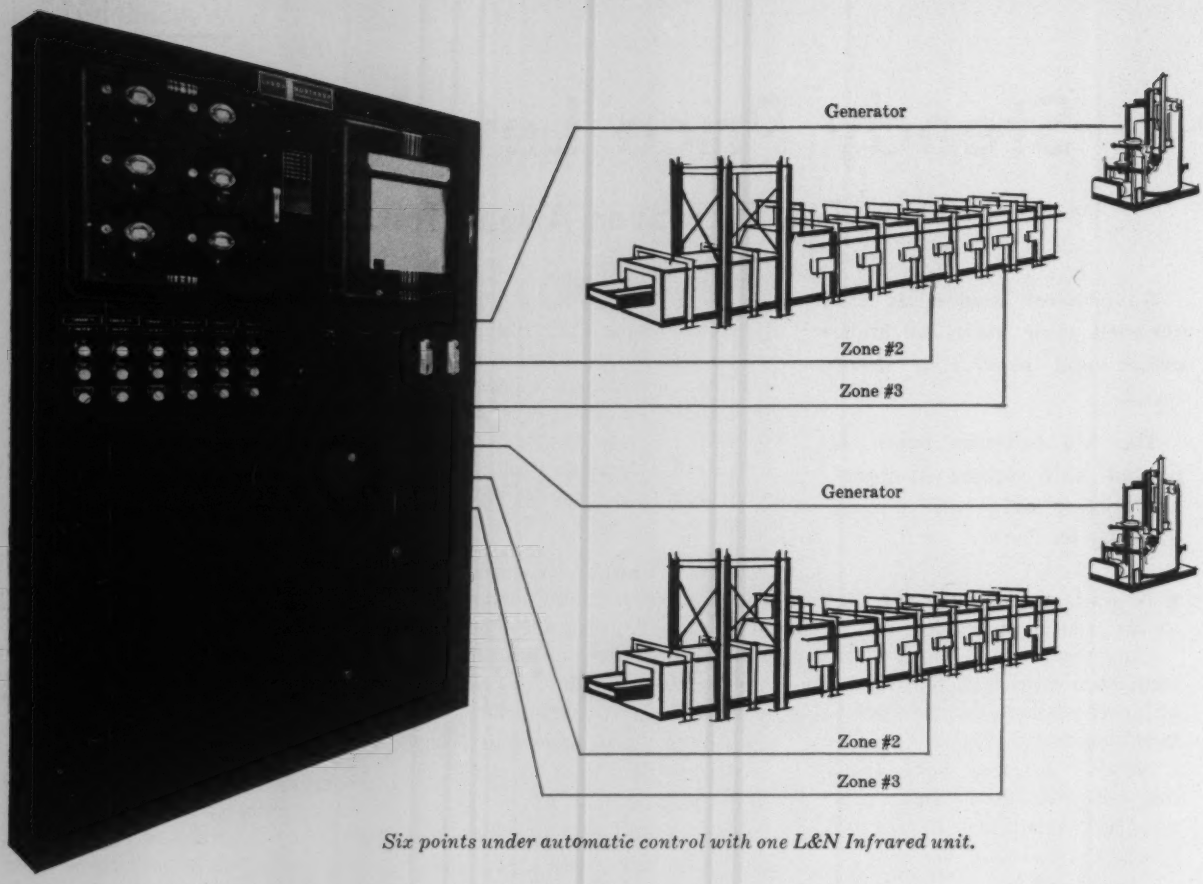
■ A Senate committee is taking a fresh look at the narrowing share of defense business held by smaller firms. While large suppliers have increased their slice of the total volume of defense contracts, the dollar volume of business held by smaller firms has shrunk.

Hearings Set—Starting April 5, the Senate Small Business Committee will hold three days of public hearings to find out why smaller suppliers are losing ground and what can be done to reverse the trend. Committee Chairman John Sparkman, D., Ala., says he wants to know why so many large and profitable contracts are negotiated—not made available for bidding—with selected suppliers. ("Sole-source" procurement.)

Of the $22.7 billion worth of contracts let in fiscal 1959, more than 86 were negotiated, not bid upon. And more than $8 billion of the total was negotiated with a single source, Sen. Sparkman says.

Big Difference—Smaller firms received only 10 pct of negotiated contracts. But they received more than 50 pct of contracts awarded by open competitive bidding.

Military procurement officers will be asked to explain why they do not permit all interested parties to bid upon defense business. And why they prefer to negotiate privately with only a handful of selected suppliers.



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Electronics Firms Look Skyward

Missile-Rocket-Space Market Keeps Increasing

Electronics industry is second largest employer in the Farwest, crowding areospace industry for first position.

Planemakers are getting into the business, some have already set up separate electronics divisions.—By R. R. Kay.

■ You can't afford to overlook the West Coast's electronics industry. It's growing at a rapid rate.

There's a huge stacked-up demand for electronic equipment. Last year, the industry sold $2 billion worth of goods. This year's sales are running higher.

Metalworkers who want to add to their product mix, would do well to look into the electronics business in the Farwest.

Strong Second—Here's a glance at the size and scope of the industry in the 11 western states:

Over 800 companies employ 150,000 persons. The annual payroll tops $650 million.

The industry is in second spot in number of factory workers. The aerospace industry is first. But in a few years, the electronics business is likely to take over the No. 1 position.

Where is the heart of the market? It's in southern California. Over 600 of the plants are there. In metropolitan Los Angeles, one out of every six factory workers is in some phase of electronics.

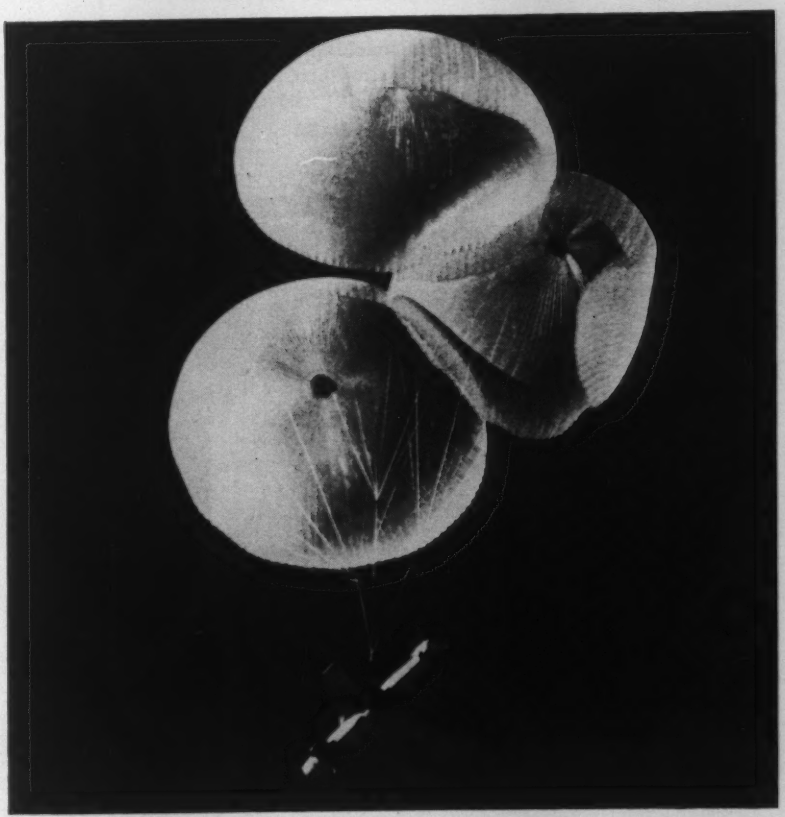
Trends to Watch—The industry on the Coast is looking skyward. Two trends will push it along:

(1) Planemaking is tapering off. The major airframe companies are getting more and more into electronics. They're going after bigger slices of missile-rocket-space vehicle business. Several are now set up with separate divisions to make electronics components. They aim to develop non-military business as well.

(2) More and more engineers and scientists are going into business for themselves. New electronics firms open up at a faster clip in California than in any other part of the country.

Marketing Problems—Like any growing giant, this industry, too, has its problems. Biggest need right now? "To build our marketing capability up to the level of our technical capability. Our marketing know-how today is at the stage where our engineering was in 1943." So says industry leader H. Leslie Hoffman, president, Hoffman Electronics Corp., Los Angeles.

Missile "Bird" Floats Earthward



MACE RECOVERED: An Air Force MACE tactical missile returns to earth after successful flight at Holloman Air Force Base, New Mexico. Parachute recovery kit carried in place of a warhead permits recovery and re-use of the MACE. The missile was built by Martin Co.

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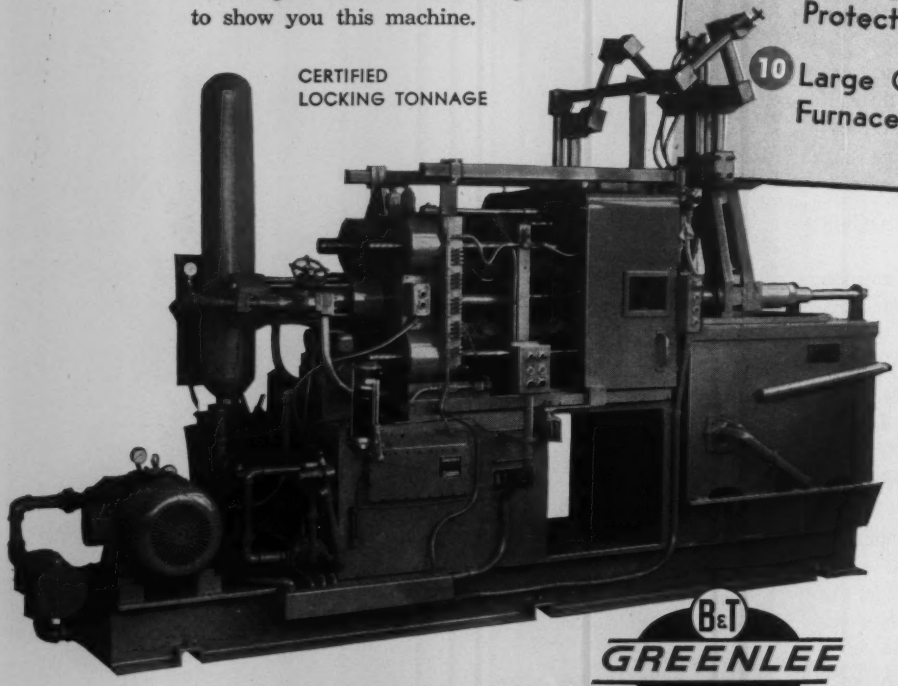

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Tricky Missile Problem Solved

Bullard Machine Uses Dual Tracer Controls

Machining missile parts is a continuing challenge to machine tool makers.

Bullard machine shows how one complex problem was brought under control. — By R. H. Eshelman.

▪ Notoriously tough and tricky problems plague the missile field. Precision, reliability and quality standards are out-of-this world. Couple this with low volume. Then how can you take advantage of automatic methods?

It is possible with some new developments. One new machine developed for this field does just that. It's a swiveling, single head grinder. Designed for the important job of surface grinding missile nose cones, it can claim to be a trailblazer in several ways.

The Description—For one thing it's automatic in operation. This possibility stems from use of two-dimensional tracer controls plus an unusual swiveling control. A single template guides the movements of the grinding head as it works down the cone. Two separate followers, on a common axis, ride the template edge. One controls horizontal and vertical feed; the other directs the automatic swiveling mechanism.

The first machine, with a 66-in. table and 8-ft maximum work height, has been delivered to Avco Corporation's Lycoming Division, Stratford, Conn. A scant 10 months elapsed from conception of this machine to delivery. The Bullard Company of Bridgeport, Conn. designed and built it.

Uses Standard Components—Part of the secret of this fast work lies in the use of standard components. As a result, cost has been held remarkably low for a special purpose machine.

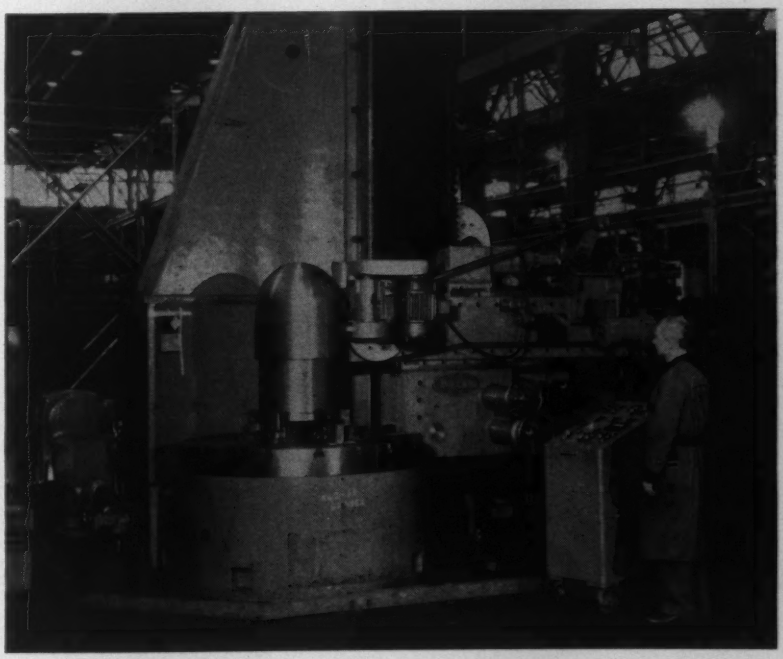
Designers describe the job of grinding nose cones as one of precision line-contact. The straight-face of the grinding wheel must be held parallel to surface of the work at all times. To be technical—perpendicular to the tangent of the contour of the surface.

The Advantages — Line-contact grinding is faster and produces a smoother surface than conventional point-contact grinding, it's claimed. Also, with line-contact grinding, there's less wheel wear for a given amount of material removed. This means less - frequent dressings, longer wheel-life.

There's another possibility that lends added versatility. The entire grinding unit with drive motor comes off. Then you merely add cutting tools. Result: Precision contour-machining utilizing the same tracer control and automatic swiveling as in grinding.

Tooling Conference

Perhaps as an outgrowth of industry building block standardizations meeting, a JIC-type conference is slated in Detroit this spring, March 21-23. Aim of the sessions is to explore standardization of tooling areas on general purpose machines — mounting of grinding wheels, T-slots in milling tables, drill press spindles, etc.



IN ACTION: Special precision contour Bullard utilizes dual tracer controls and automatic swiveling in precision grinding of missile nose cones.

INDUSTRIAL BRIEFS

Jet Forgings—Since Feb. 1, Steel Improvement & Forge Co., Cleveland, has been given the go-ahead on production of over $500,000 worth of forgings for jet transport components. This brings to over $1¼ million the orders currently in hand for forged parts.

Rounding Out the Line—Ferro Corp., Cleveland, acquired the Vitro Mfg. Co., division, Pittsburgh, of Vitro Corp. of America. The transaction was made in cash for about $½ million. The acquisition will round out Ferro's line of colors for porcelain, enamel, clayware, and plastics.

Action in Reactors—The Nuclear Div., The Martin Co., Baltimore, will develop a series of computational codes for small pressurized water reactors. The U. S. Atomic Energy Commission contract is valued at $335,000 through the end of November. Work is expected to continue through 1962.

Biggest on the Coast — A new $500,000 plant will be built at Hillsboro, Ore., by Armco Drainage & Metal Products, Inc. The new plant will be Armco Drainage's largest facility on the West Coast for producing corrugated metal pipe. It will replace the company's present plant in Portland.

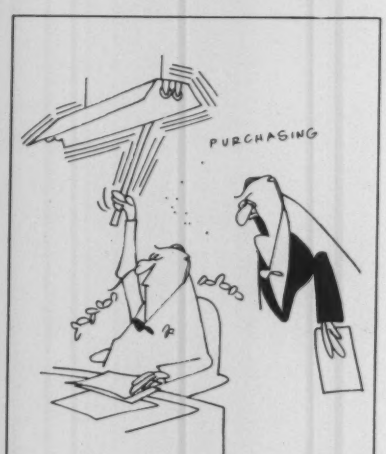
Acquires Controls — Electro-Mech Corp., Norwood, N. J., manufacturers of control systems and associated control apparatus, has been purchased by American Chain & Cable Co., Inc., New York. Electro-Mech was founded by Mr. P. A. Sutton. It will continue to operate as a subsidiary with Mr. Sutton as its president and general manager.

Overseas Venture — Camloc Fastener Corp., Paramus, N. J., will form an European subsidiary "Camloc Fastener GmBH". A plant has been leased at Kelkheim, W. Germany. The company will represent customers in the European Common Market countries and Free Trade Area. It will also develop new business and equipment being designed and manufactured in those areas.

Division for Controls — Borg-Warner Corp. has formed a new division known as the Borg-Warner Controls Div. It is located at Santa Ana, Calif., and will take over the personnel, products, and existing facilities of the BJ Electronics plant of the parent company.

New Business in Barrels — M-F Equipment Co. has been formed to handle sales of barrel finishing equipment. W. H. Armstrong, vice president, Metal Finish, Inc., has been named president of the new company. The new company will headquarter at 410 Frelinghuysen Ave., Newark, home offices of the parent company.

Semiconductor Expansion—Westinghouse Electric Corp. will build a new facility for its semiconductor department at Youngwood, Pa. Facilities will be expanded by 30 pct and provide an additional lab and manufacturing area. It will be devoted to the development and processing of semi-conductor materials, new forms of silicon and germanium.



"When you need my signature, just call me . . ."

ELPIT Through Rust — Rust Furnace Co., Pittsburgh, will design, market and erect electric soaking pits and reheating furnaces under the trade name of ELPIT. Rust acquired the exclusive license to sell and erect the ELPIT in the U. S., Canada and Mexico. Agreement is with Ingenior Gunnar Schjelderup, Industriovner, Oslo, Norway.

Licensed Tower — Under terms of an agreement, the new ALCAN guyed transmission tower designed by Aluminum Ltd. will be engineered and manufactured in the U. S. by Michael Flynn Mfg. Co., Philadelphia. It's designed for economies in the construction of electric power lines.

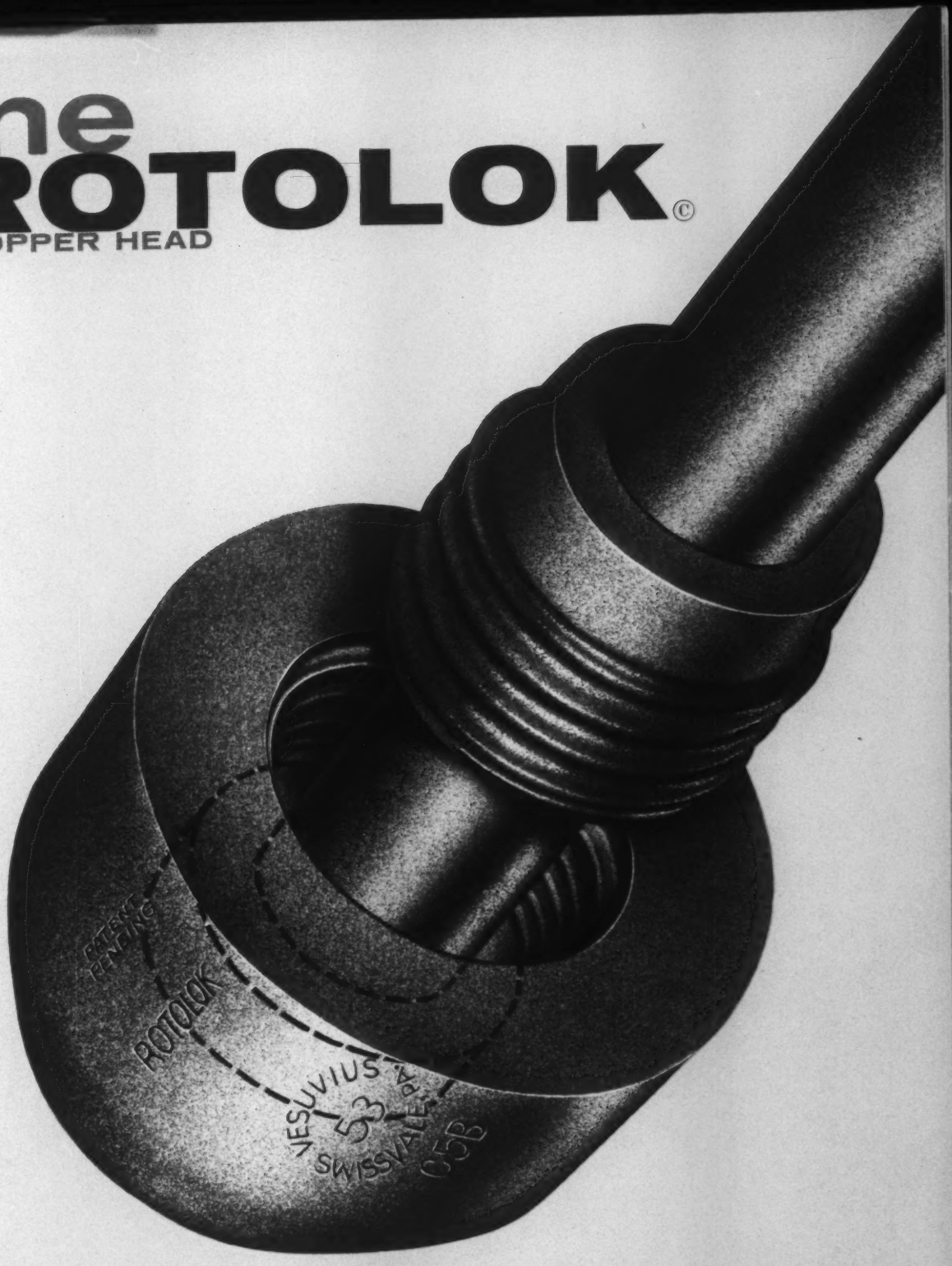
To Detroit — Coated Abrasives, Inc. has transferred its manufacturing and headquarters operations from Milwaukee to Detroit. The company's new manufacturing plant is located in Warren, Mich. General staff offices are at 11920 East Eight Mile Rd., Detroit.

Electrical Subdivision — Manufacturers of generation, transmission and distribution equipment joined in forming their own division within the framework of the National Electrical Mfrs. Assn. C. H. Bartlett, a member of the NEMA Board of Governors, has been elected Chairman of the Div.

Headed West—Lehmann-Fulton Boring Tool Co., St. Louis, has expanded its western U. S. distributor organization. Five companies have been granted exclusive franchises to handle the company's line of boring tools. They are: Coast Tool Co., Oakland; Copper State Machinery Co., Phoenix; SeaPort Co., Seattle; Brandt Sales Co., San Diego, and Tool & Abrasive Supply Inc., Los Angeles.

All Together — Headquarters office personnel of American Metal Climax, Inc., and its operating divisions are located at 1270 Ave. of the Americas in Rockefeller Center, New York.

the ROTOLOK©
STOPPER HEAD



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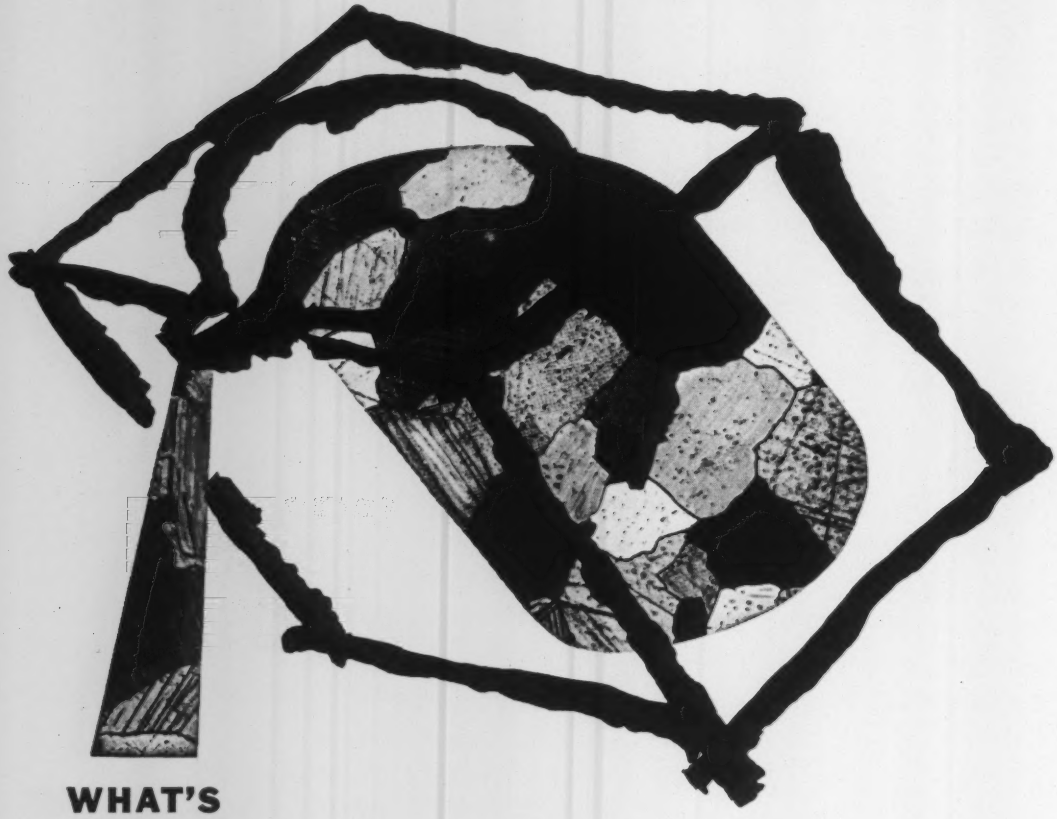


WHAT'S HAPPENED TO INDUCTION MELTING IN THE LAST SEVEN YEARS?

It's a little like the old days all over again! Induction melting passed twenty-five years without change. Then Inductotherm decided to bring induction melting up to date. Since that day, seven years ago, there've been some changes made.

To the basic advantages of induction melting—speed, cleanliness, magnetic stirring—Inductotherm has added easy installation, easy operation, and easy care.

For example, Inducto® initiated power feed through the trunions in their tilting furnaces—thus reducing lead length, cutting power loss, simplifying pit construction. Small furnace design is also ingenious. Even the smallest hand held furnaces have "plug-in" mercury type fittings for fast and effective power disconnect during a pour.

Why do business with Inductotherm?

The biggest innovation in induction melting has been the Inductotherm concept of service. Not just fast repairs and overnight replacement of parts (even M-G sets) . . . but a basic concept of "why we're in business." *Inductotherm is out to fit induction melting to your needs.* We will make every effort to improve our equipment and the induction technique, never asking you to trim your needs to the limitations of our equipment.

If you'd like more information on Inductotherm furnaces, write for Bulletin 70. But, for a taste of Inductotherm service, ask to have an engineer call. Inductotherm Corporation, 412 Illinois Ave., Delanco, New Jersey.

INDUCTOTHERM

W. V. Farr, appointed treasurer, Pittsburgh Steamship Div., U. S. Steel Corp.

Gartland Foundry Co.—**W. M. Grimes,** elected president; **R. S. Hodler,** named vice president and general manager, Terre Haute, Ind.

The Erie Malleable Iron Co.—**P. H. Vincent,** appointed chairman of the board; **R. W. Griswold,** appointed president and general manager; **B. H. Scott,** appointed vice president, sales.

C. H. Sprague & Son Co.—**P. F. Masse,** elected president.

Armco Steel Corp.—**R. L. Jolley,** becomes a consultant.

Stromberg-Carlson's Commercial Products Div.—**D. W. Burns,** promoted to technical assistant to the vice president and general manager.

General Motors Corp.—**H. H. Dice,** elected vice president.

Norge Div., Borg-Warner Corp. —**J. S. Sayre,** elected chairman of the board and chief executive officer; **R. H. Quayle, Jr.,** named president; **H. P. Bull,** appointed vice president and asst. to the president; **W. C. Fisher,** becomes vice president, sales.

Illinois Tool Works — **R. W. Beart,** elected vice president, patents and development.

The Yale & Towne Mfg. Co., Yale Materials Handling Div.—**N. J. Kemp,** named manager, Chicago branch; **A. H. Dobler,** named an executive officer of the division in Chicago.

Jones & Laughlin Steel Corp., Stainless and Strip Div.—**H. A. Whitbeck, Jr.,** named resident manager, sales, San Francisco office; **P. G. Renn,** named resident salesman, St. Louis office.

American-Standard, Tonawanda Iron Div.—**R. F. Houghtaling,** appointed a sales representative.

Baker Industrial Trucks, Div. of Otis Elevator Co.—**Wilton Smith,** appointed Portland branch manager.

J. C. Brantley, appointed director, research, Union Carbide Nuclear Co., Div. of Union Carbide Corp.

Minneapolis-Honeywell Regulator Co.—**Fred Kaiser,** appointed regional vice president.

Chain Belt (Canada) Ltd.—**L. E. Newton,** elected executive vice president and director.

ACF Industries, Inc.—**H. C. Hopkins,** elected vice president, purchasing.

U. S. Steel Corp. National Tube Div.—**J. E. McDonald,** appointed

(Continued on P. 90)

R. G. Nolte, promoted to executive vice president, Duff-Norton Co., Pittsburgh.

Cleighton Hilbert, named vice president, manufacturing, Duff-Norton Co., Pittsburgh.

T. W. Krueger, promoted to vice president and general sales manager, Duff-Norton Co., Pittsburgh.

FORMULA FOR TOMORROW

THE MACHINE TOOL EXPOSITION - 1960

INTERNATIONAL AMPHITHEATRE

CHICAGO, ILLINOIS

SEPTEMBER 6-16

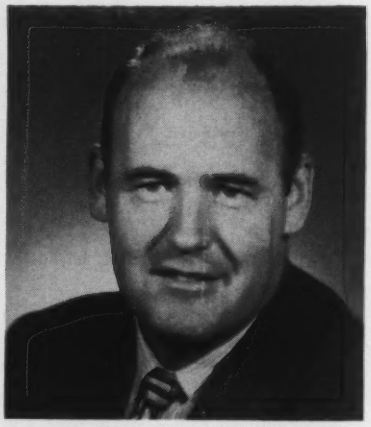
NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION

MMT-PE

(Continued from P. 89)

manager, mechanical and pressure tubing products.

J. L. Hough, appointed chief engineer, Youngstown steel plant, Republic Steel Corp.



D. B. Scott, appointed manager, Control Dept., Allis-Chalmers Mfg. Co.

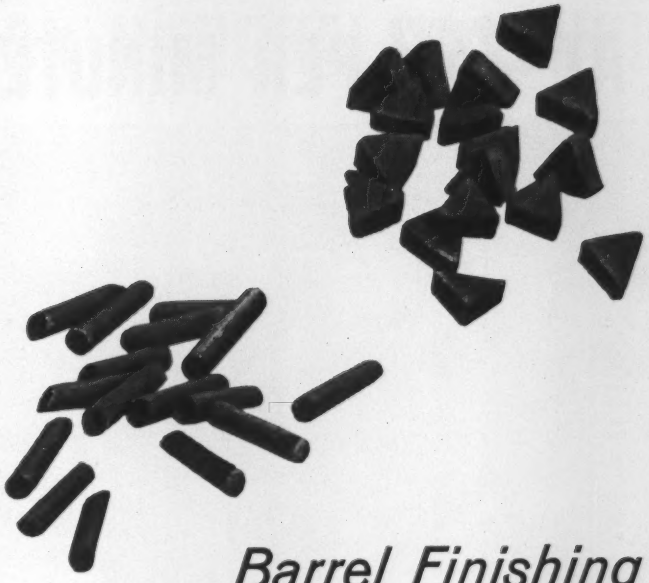
Republic Steel Corp.—**H. E. Freeland,** named superintendent, blooming and billet mills, Warren, O., plant.

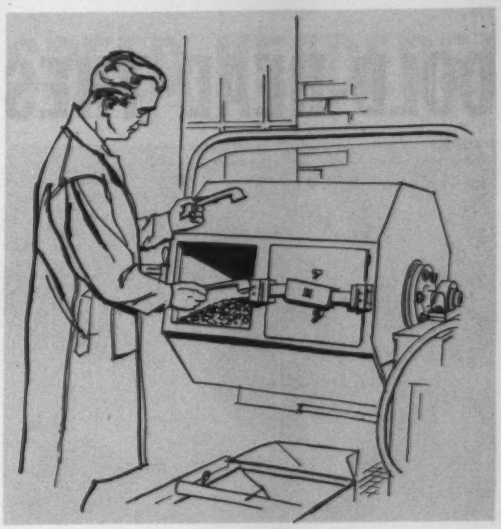
E. W. Bliss Co., Die Supply Div. —**Herman Schroll,** appointed sales manager.

The Garlock Packing Co., Marketing Div.—**James Marmor,** appointed contract coordinator, Military Products Dept.

Clark Equipment Co., Industrial

(Continued on P. 94)

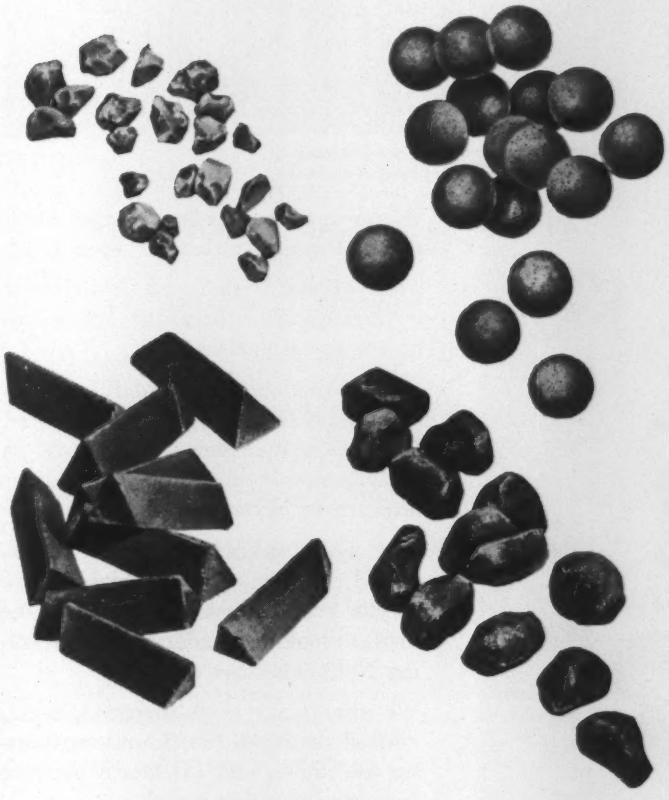




Barrel Finishing is best finishing

. . . with TUMBLEX abrasives*

. . . and you get them fast, too



To give parts, ranging from tiny needles to hefty castings, a fine, uniform finish — and to save substantially on all your finishing jobs — make sure you:

Combine the right barrel finishing techniques with abrasives that perform best—and are delivered to you fast.

From Norton you can get the broadest range of top-performing barrel finishing abrasives. For quick shipments complete stocks of the following TUMBLEX abrasives are maintained at Worcester: random shaped "A" in 14 sizes . . . bonded "T" triangles in six sizes . . . bonded "S" spheres in five sizes . . . bonded "RP" round pins in two sizes . . . bonded "TP" triangular pins in one size . . . "N" natural stones in seven sizes.

You get further assurance of prompt deliveries to help you avoid production delays. Adequate stocks of the most popular TUMBLEX abrasives are kept at your nearest Norton branch warehouse or at your distributor's.

Send samples of your work to our Sample Processing Department. We'll barrel finish, return samples and report the methods and abrasives you need for better, lower cost finishing. NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

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NORTON
ABRASIVES

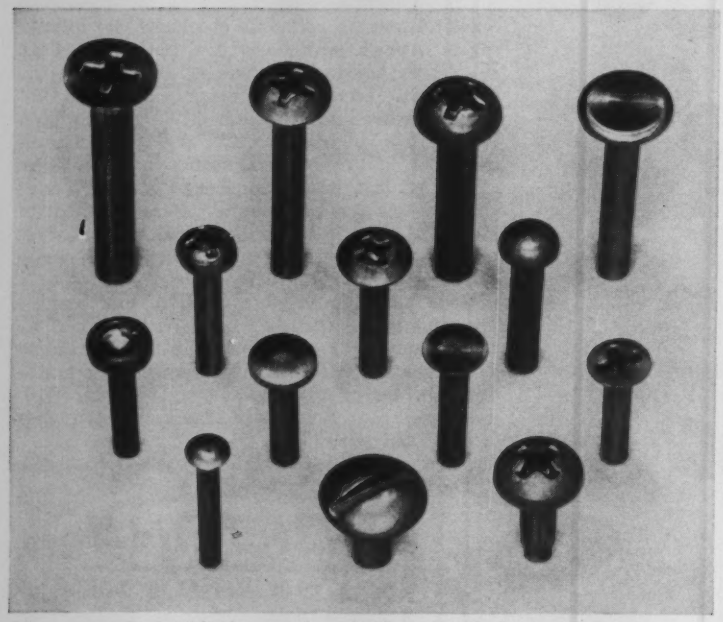
G-387

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

COLD-HEAD THESE AT 450 PER MINUTE

National High Speed Headers are capable of producing a wide variety of odd shapes like the above, as well as conventional fastener blanks.



Screw blanks stand perfectly erect. Such accuracy of product begins with a square, clean cutoff blank.

If you operate Headers, or use metal parts in quantity, here is good news.

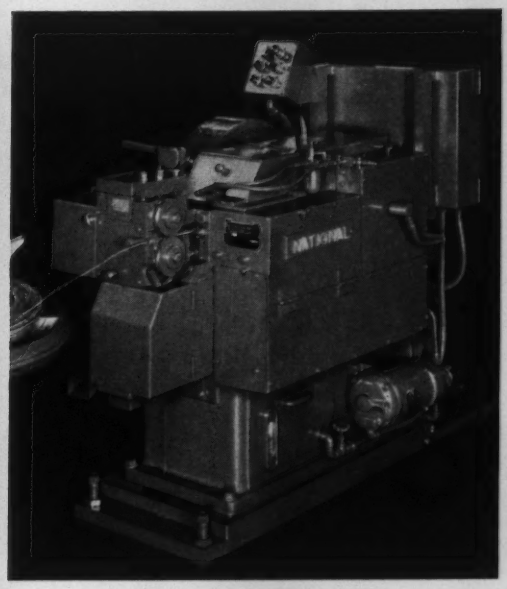
The National High Speed Cold Header is the exciting new breakthrough in producing metal parts!

Witness production runs of difficult-to-make parts. Observe the many advanced features in machines and tooling, as well as new cold-heading techniques now proved in everyday production.

Start now toward the benefits of sustained production at the highest *safe* speeds ever achieved. Be among the forward-looking header plants installing Nationals these days.

We offer you (1) A precision, hand-crafted machine, (2) Sound engineering assistance, and (3) Our experience in helping you flow metal.

ON NATIONAL 1/8" HIGH SPEED HEADERS!



1/8" High Speed Double Stroke
Solid Die Cold Header: 450
accurate pieces per minute

3/16" High Speed Double-Stroke
Solid-Die Cold Header:
350 accurate pieces per minute

Not just speed alone, but speed *plus...*

- Accuracy of Product
- Rigidity—Good Tool Life
- Holds Adjustment Well
- Lower Maintenance
- Fewer and Simple Adjustments
- Can Handle Many Jobs

We welcome you to Tiffin for actual demonstrations and a thorough study of your cold heading requirements.

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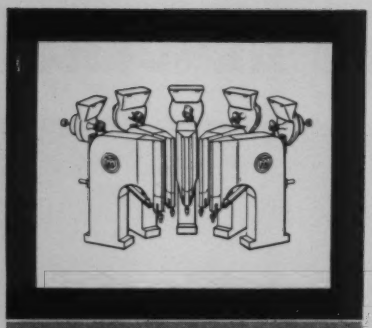

NEW "BUILDING BLOCKS" for automatic riveting

Milford's Models 56 and 57 offer unlimited flexibility in automatic assembly!

Group these new "Building Blocks" to suit your production needs. Use them singly, in pairs, in threes, fours or even fives. Write for more information on multiple riveting, the newest answer to reducing assembly costs.

For more new ideas, tips and technical data on tubular rivets and rivet-setting machines, ask your Milford Representative for a look at Milford's new MANUAL OF MODERN RIVETING PRACTICE.

THE MILFORD RIVET & MACHINE CO.

MILFORD, CONNECTICUT • HATBORO, PENNA.
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(Continued from P. 90)

Truck Div.—**R. M. Tobin,** appointed sales manager, Chicago factory sales and service branch.

Alloy Metal Abrasive Co.—**R. W. Olsen,** named western sales manager, and **C. P. Vogel,** named eastern sales manager.

C. E. Ho, named manager, catalyst Sales and Development, Climax Molybdenum Co., Div. of American Metal Climax, Inc.

Reed Instrument Bearing Co., Div. of SKF Industries, Inc.—**L. P. Dickey,** named general sales manager; **D. R. MacKay,** manager, eastern sales, Teterboro, N. J.; **J. R. Peticolas, Jr.,** manager, midwest sales, Melrose Park, Ill.; **J. F. Chilton,** manager, western sales, Los Angeles; **R. E. Bryant,** sales coordinator, Los Angeles.

Robert Penovich, appointed asst. superintendent, Union Drawn Steel Div. plant, Massillon, O., Republic Steel Corp.

H. W. Hopwood, appointed director, public relations, Republic Steel Corp., succeeding E. S. Bowerfind who has retired.

Republic Steel Corp. — **A. F. Connors,** appointed asst. director, public relations.

U. S. Steel Corp.—**W. W. Lang,** appointed senior general attorney.

E. F. Houghton & Co.—**W. J. Walton,** appointed lubrication engineer, Philadelphia; **N. F. Monahan,** named asst. to manager, Hydraulics & Transmission Dept.

Joseph T. Ryerson & Son, Inc. —**G. W. Ireland,** appointed manager, General Order and Merchandise Inventory Dept., Houston, Texas plant.

National Forge Co.—**L. W. Ollila,** appointed director, manufacturing.

Standard Steel Corp., Cambridge Div.—**R. F. O'Neill,** promoted to manufacturing manager.

The Steel Improvement & Forge Co., Champion Div. — **H. G. Howell,** appointed general manager.

Beckman Instruments, Inc.—**K. C. Moulton,** named director, marketing, Fullerton, Calif.

Sorensen & Co.—**Jesse Stitzer,** appointed engineering manager.

The Gabriel Co., Gabriel Electronics Div.—**B. J. Pawlowski,** appointed engineering marketing manager.

stop temperature variations in high density loads with SURFACE POWER CONVECTION

Exceptional uniformity and speed of heat treating, regardless of load density, help make a consistent profit-maker of this mechanized line of Surface batch-type furnaces at The Milwaukee Gear Company.

Because of Surface Power Convection, Milwaukee Gear has much greater metallurgical control and uniformity of product than ever before. High-velocity wind penetrates the tightest loads; assures uniform heat transfer whatever the size, shape, or alloy of the work.

Carburizing case depths are hit right on the button which vary from a few thousandths to 3/16 of an inch. This unusually flexible standard rated furnace line consists of two Super Allcase® furnaces, a horizontal draw furnace, spray washer, DX® and RX® gas generators, and Autocarb® signalling dewpoint controller.

Surface Power Convection cuts cycle times to a fraction.

These advantages only suggest the profitability of Surface Power Convection. Ask your Surface representative to describe the most important development in convection heat transfer in 20 years.

Write for Bulletin SC-182.

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Surface

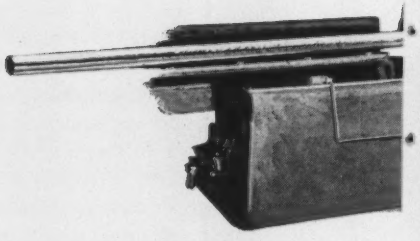
LOOK TO

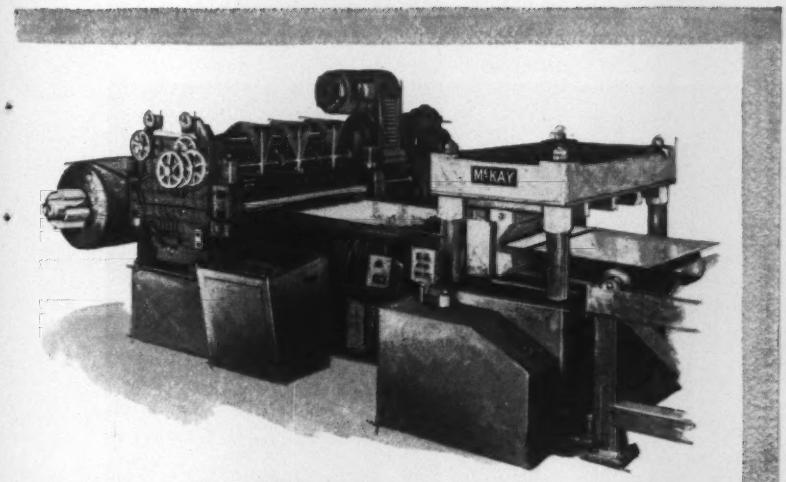
McKAY

MACHINE

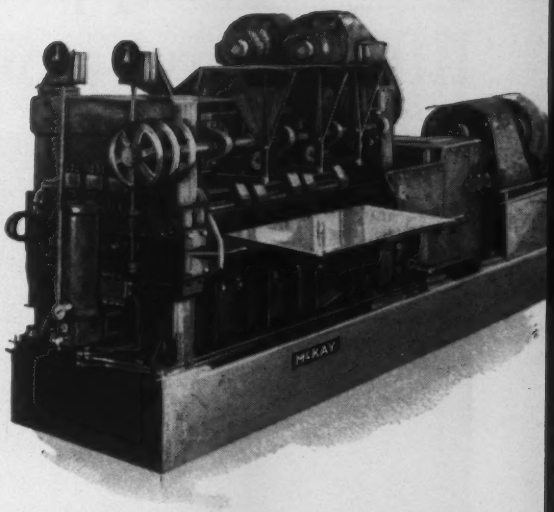
FOR PROGRESS IN METAL PROCESSING

McKAY PIPE MILLS





McKAYMATIC* DIE SHEAR LINES



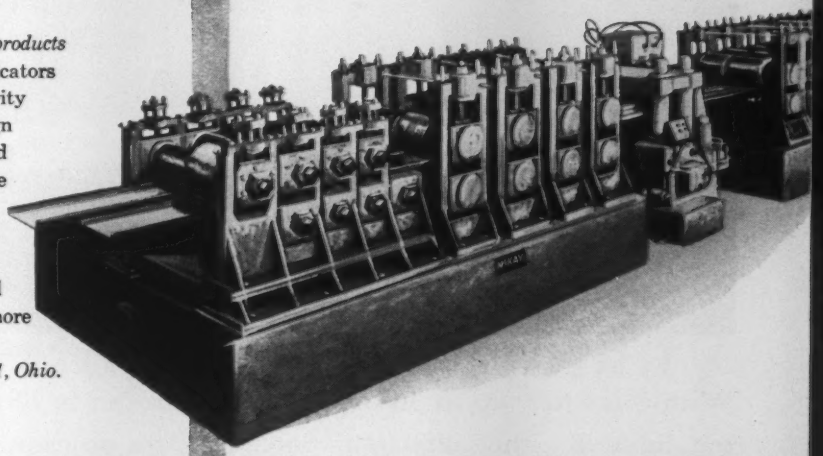
McKAY ROLLER LEVELERS

No machine manufacturer puts more into its products than does McKay. Metal producers and fabricators have learned they can expect and get integrity and honest value—the most advanced design and engineering—the finest construction and service—when they specify McKay Machine metal processing equipment.

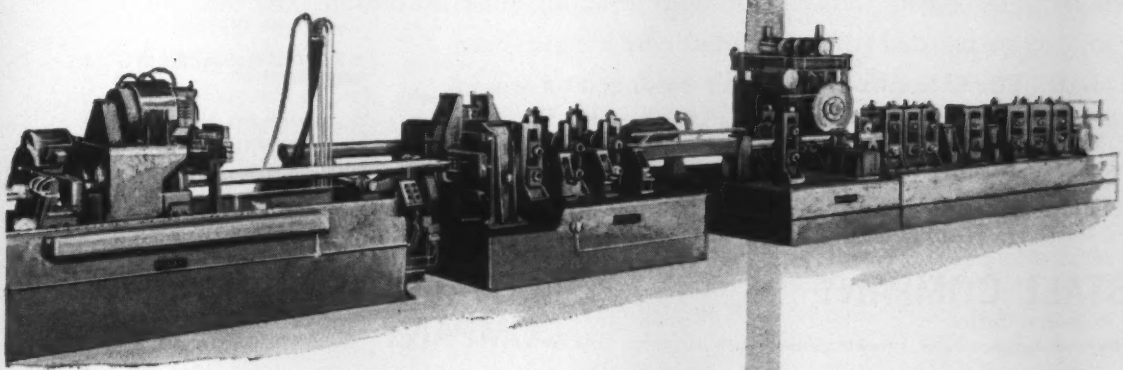
Look to McKay Machine in 1960 for more automatic machines, like those illustrated here, well conceived and skillfully developed to help you do your work faster, better and more economically than ever before.

The McKay Machine Company, Youngstown 1, Ohio.

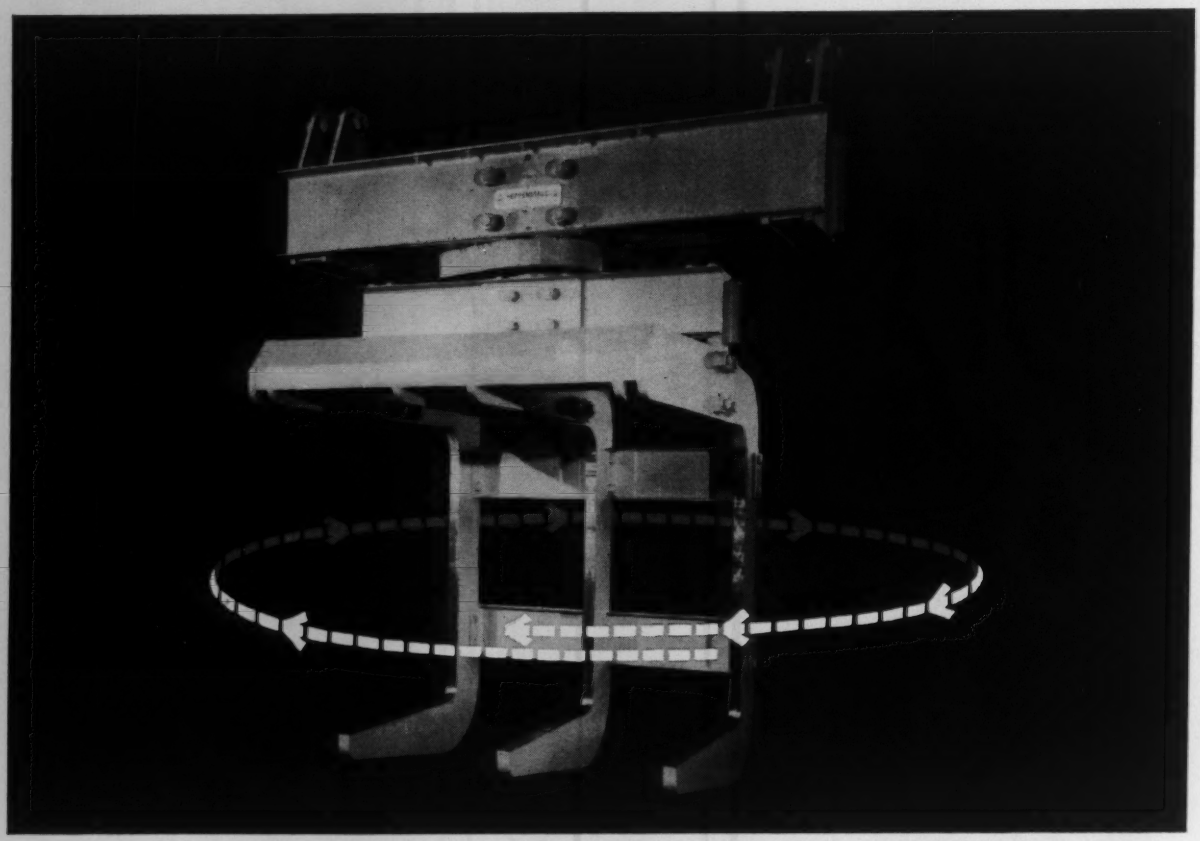
*TM



McKAYMATIC* FORMING MILLS



NEW Heppenstall motorized slab lifters have continuous 360° rotation



Slabs may be rotated in either direction quickly and easily by this Heppenstall Slab Lifter.

With this lifter, up to 30 tons of steel slabs can be lifted and automatically rotated without limit in either direction. Spreader bars position the three high-tensile alloy steel C hooks on 32-inch centers. The rotating mechanism is contained within a double beam which has two bails on 8-foot centers for double crane hoist mounting. For maximum stability, the load is suspended from the rotator by a rigid, bearing-mounted shaft. The C hooks are counter-balanced to remain level at all times. For more information or a quotation, contact your Heppenstall Company Representative or Heppenstall Company, Materials Handling Division, New Brighton, Pennsylvania.

SEE OUR CATALOG IN SWEET'S PLANT ENGINEERING FILE OR WRITE FOR COPY

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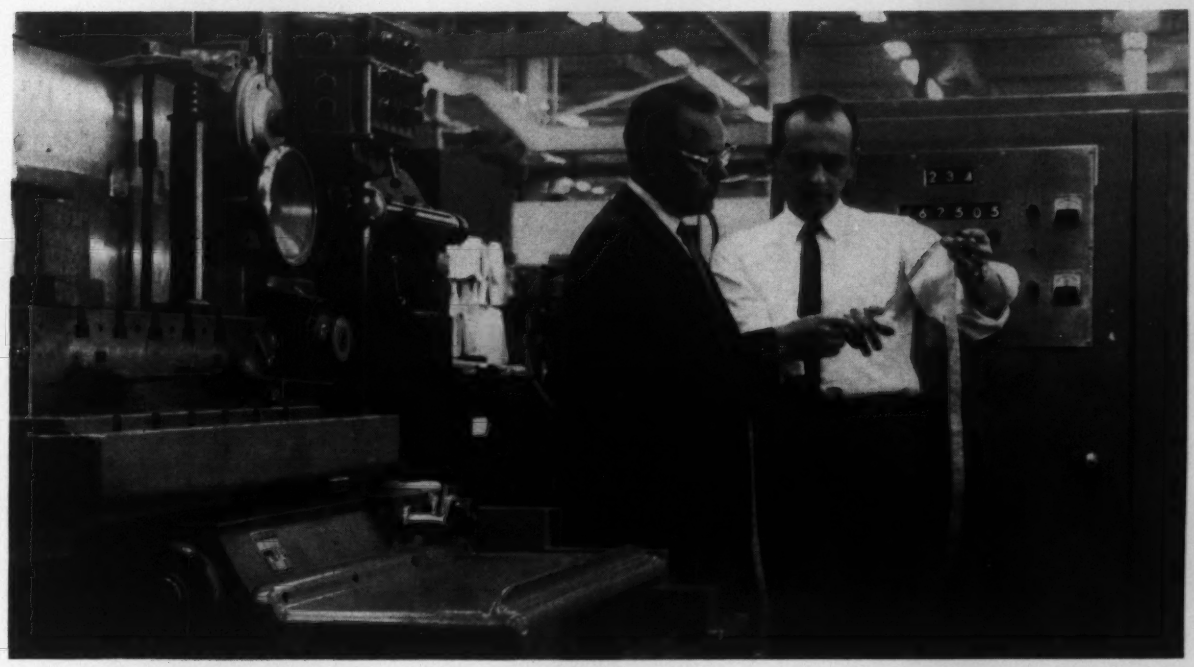


FAST SETUP: Two-axis system controls horizontal jig mill from punched tape program, simplifying tooling. President C. R. DeVlieg discusses operation with R. A. Jerue, vice president, engineering.

Tape Control for Boring Mill Adds Fast Setup and Versatility

Developed and designed from the machine user's viewpoint, this new system boosts utility of numerical control.

Building blocks of the down-to-earth approach are plug-in electronics and standard parts. You can refit present mills too.

By R. H. Eshelman,
Machinery Editor

▪ Latest in a series of numerical control developments is this use of punched tape control on DeVlieg horizontal boring mills. Here's one answer to shop critics who have shunned numerical control as electronic magic.

It's a sensible system designed and built for shop conditions. And because it's based on the DeVlieg Machine Co. jigless boring system, there's no mystery to it.

Easy to Learn—Actual experience shows that tool engineers can learn to program parts in 3 or 4 hours. Flexowriter typists can learn to prepare punched tapes with a few minutes' instruction.

Tool designers who have been used to designing fixtures for "jigless machining," can do so for tape-controlled jig mills with little orientation of their thinking.

An experienced operator can confidently set up and operate the new boring mills in a few hours. But the prime goal, to lick maintenance and service, strikes at one of the job-shop man's major objections to electronic equipment.

Big Field — President of the Royal Oak, Mich., company, C. R. DeVlieg, explains, "Tape control, we feel, is for the many intermediate plants; they have short-run, repeat production with too few pieces per lot to really tool up, yet too many pieces to do without tooling. With numerical control you put the tooling on the tape."

He notes a wide interest in numerical control from such varied fields as: aircraft and missiles, atomic energy, tool and die and other job shops, industrial machin-

ery, machine tool builders, automotive suppliers, pump and process machinery makers, printing, textiles, and tractors.

Because of increasing industry demands for precision and operator limitations, he foresees that in a very short time numerical control—tape or dial type—may represent 50 pct or more of their product value. These horizontal boring machines are aimed at precision needs.

Save on Setup Time—But with tape control, experience in early installations shows that precision boring will represent only about 25 pct of machining time. Because of savings in setup time and tooling, they'll be used on multiple operations as well, such as drilling, tapping and milling.

DeVlieg's design and development engineers explain their ideas on numerical control: "We have attempted to package it into a truly industrialized unit."

For instance, they've put the automatic machine controls in a size 12 NEMA standard enclosure. Electronics are transistorized; they've used printed circuits throughout, and solid state switches wherever possible.

In the entire control panel there are only two types of plug-in relays. This means you need only two spares. Checking with the testing board it's possible to quickly locate any breakdown, replace the defective unit.

Two-Axis System — The basic, two-axis tape control system depends on the familiar DeVlieg master measuring bars for horizontal and vertical coordinates. Each coordinate has a movable electromagnetic sensing head.

Punched tape directs the machine spindle to a dimensional setting by inch and decimal decade switches. The two axes of travel, of course, are horizontal cross-spindle travel and vertical spindle head movement.

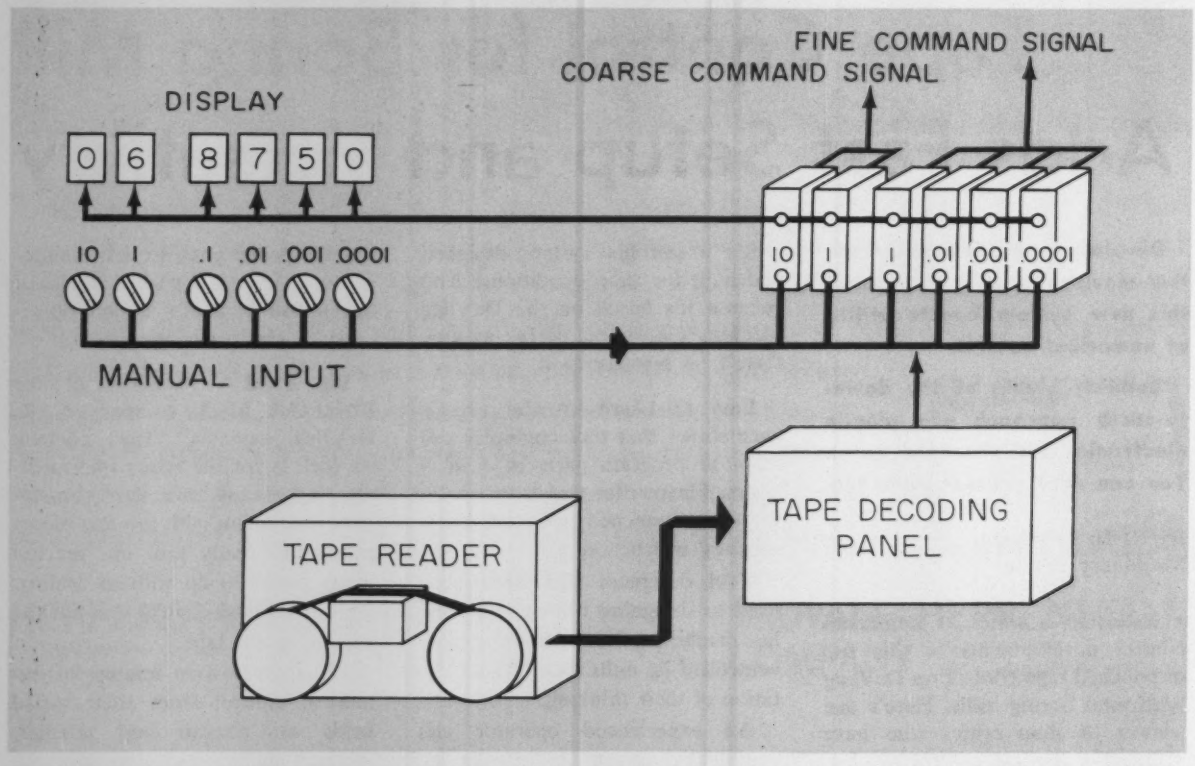
Automatic positioning of the system can repeat to within 0.0001-in. The system also permits the operator to dial dimensional settings into the console.

Tells Operator—On the control panel a three-digit window shows the process number assigned the operation in progress. By glancing at this and the program sheet, the operator instantly knows just where the job stands, and what tooling he should have ready.

In addition there's a tool change light to warn him when tools must be changed. After he changes tools, he must punch a button to turn out the signal light. An interlock stops everything until the tool change is made and the operator presses the light button.

Many Options—While the whole system is designed as an integral part of the machine, it allows great

How Boring Mill Gets Its Orders



TAPE DOES THE WORK: Decoding panel translates data picked up by reader into coarse and fine input signals.

flexibility in control. Many additional degrees of control are available, with complete compatibility.

For instance, there's a self-checking circuit that tells when desired position of both horizontal and vertical slides are reached. Indicator lights turn off only when slides are in exact location for an operation.

The basic two-axis system has a selector switch for choosing which slide you wish to position first. As another option, you can have either a sequence cycle control or simultaneous cycle control. With simultaneous control you cut the positioning time in half.

Depth Control, Too—You can install a turret depth control setup. This trips out the spindle feed at predetermined depths. In effect, it becomes a 3-D system.

Two other options are: tape control over spindle speeds and feeds, and automatic cycle control for the spindle bar rapid traverse and feed. With this it's possible to drill or bore a pattern of like holes in a surface, and complete all of them without resorting to manual control or stoppage of machine until the pattern is complete.

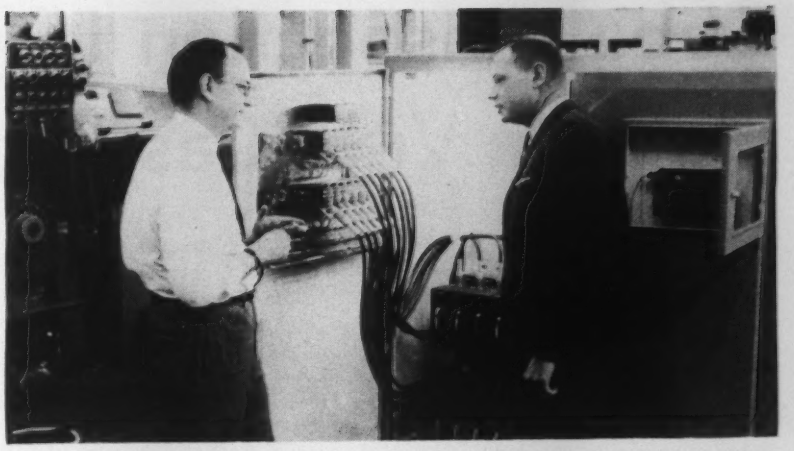
Standard Tape—Carrying out the standardization idea, the engineers have based the system on the standard eight-channel paper or plastic tape. It follows the specifications now accepted by various industry committees on numerical control. It also follows the proposed standard on code form for input of numerical data.

This means that the equipment is compatible with Flexowriter and other punched-tape setups. Chances are that if such equipment is available, and fairly recent, machine tapes can be prepared on it.

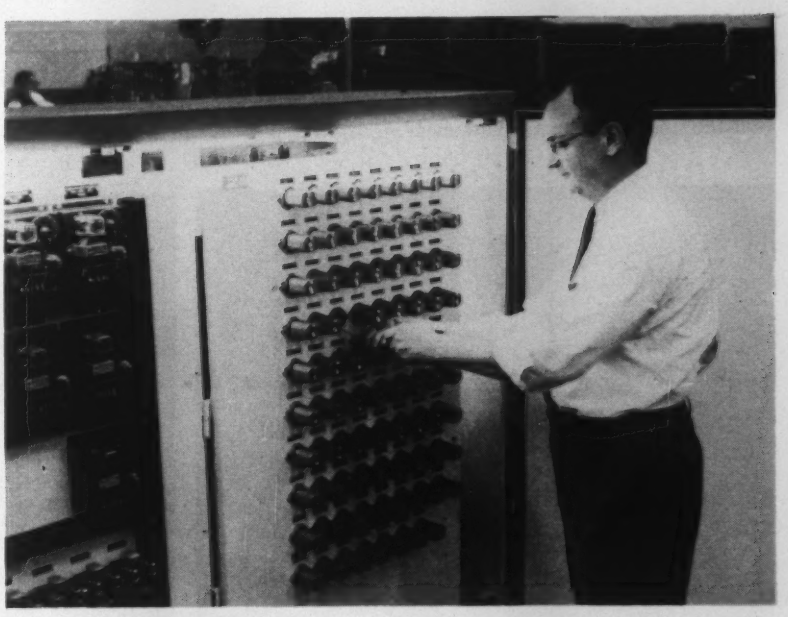
Can Refit—The company has already "retrofit" a number of fairly new boring mills with numerical-control systems. This is possible because it integrates so well into the automatic positioning system of these machines. However, there are some problems.

As C. R. DeVlieg observes, "Tape control is scarcely something you can plug into any old machine, like a phonograph, and expect it to work." The point-to-point system is a combination of three functions: positioning, measuring and control function.

Although the positioning function has been built in these machines, you need additional measuring and control. For good results, then, the machine must be torn down and reassembled to bring it up to proper accuracies. Then you can install the added elements needed.



NEAT PACKAGE: Transistors and printed circuits simplify numerical control panel, left. On right is tape reader and related equipment.



QUICK-CHANGE RELAYS: Plug-in units are quickly replaced, if one goes bad. Relays are noted to cause most equipment stoppages.

Seldom can you expect to make it pay on machines over three years old. Economics, resale values, accounting and depreciation policies and similar factors will determine what's the best course on newer machines.

Reprints of this article are available as long as the supply lasts. Write Reader Service Dept., The IRON AGE, Chestnut & 56th Sts., Philadelphia 39, Pa.

Cobalt Inspection Unit Detects Flaws in Vital Castings

Valves destined for atomic power plants have to be sound.

This Cobalt-60 radiographing setup provides inspection on production scale.

▪ A radiographing unit with a 1000-curie source allows its users, Southern Pacific Foundries, to obtain 1-pct sensitivity. That's what can be obtained in radiographing steel castings with thicknesses ranging from 2 to 10 in. when shooting at a distance of 66 in.

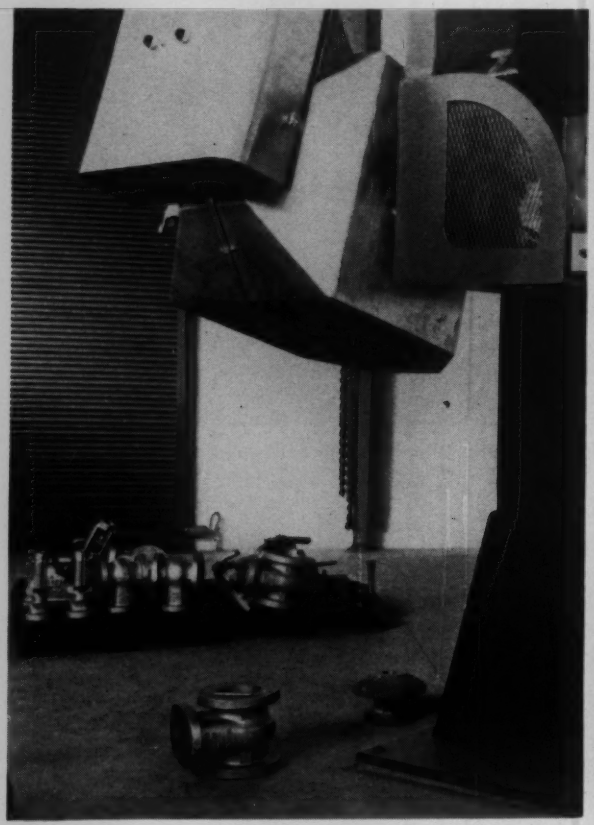
This sensitivity of 1 pct means that the unit can detect a flaw measuring 1 pct of the thickness of the material being measured. For instance, on a casting 10 in. thick, a flaw measuring only 0.1 in. would show up.

Meets Production Needs — The Bakersfield, Calif., company takes an average of 60-75 shots during the 8 hours a day it operates the setup. Company spokesmen say the radiography machine, built by Nuclear Systems Div. (now Instruments Div.), The Budd Co., Philadelphia, has operated without a hitch during the six months they have had it in operation. The machine's cobalt-60 source is expected to last about 7 years.

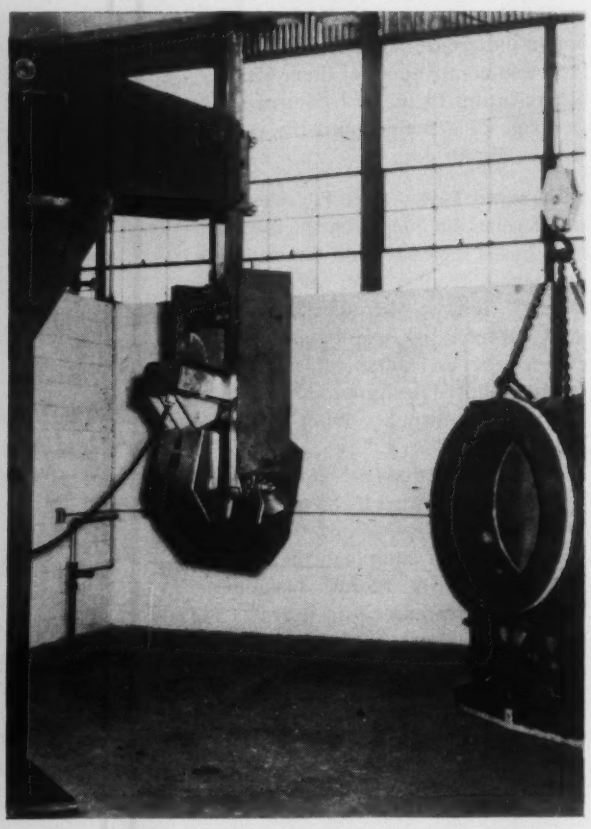
Called the Multitron Model 1060, the unit is used to radiograph high-pressure valve bodies made of such metals as stainless steel, Monel, Alloy 20, and Hastaloy B and C.

Special Housing—The company built its own special building to house the unit. The structure measures 40 x 40 ft with 25-ft height.

Special construction eliminates the danger of radiation: 10-ft high walls on two sides made of a double row of cinder blocks 3 ft apart and filled with sand; the third side made



PRODUCTION SETUP: Multitron radiographing unit is ready for production inspection of high-pressure valve bodies for critical service in atomic power plants.



FOR THE BIG ONES: Large valve body is positioned on floor with Multitron head pointing horizontal. The unit can detect a flaw measuring 1 pct of thickness.

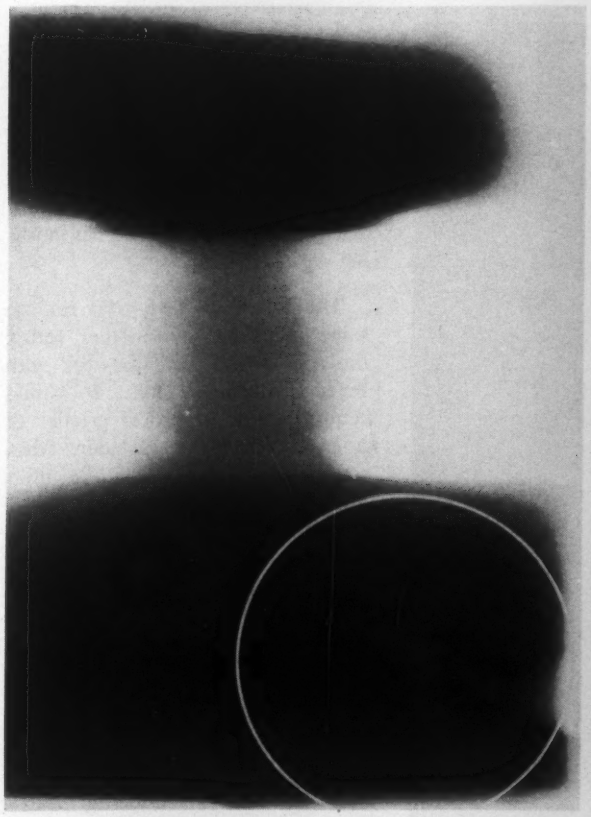
of two rows of cinder blocks 2 ft apart and filled in with concrete.

The fourth side needs no radiation shielding. It's because the Multitron can only be pointed towards the heavy walls or straight down.

Own Support — The company built its own support for the 5000-lb radiography unit. The frame includes an electric motor to raise or lower the Multitron 3½ ft and to rotate it 90° from the horizontal to the vertical, pointing down.

Two lengths of 18,000-lb test aircraft cable are looped around the unit's supports as a safeguard in case one of its self-aligning bearings should fail. A complete system of interlocks makes it impossible for persons to enter the radiography room when exposures are being made.

REMOTE CONSOLE: Entire inspection cycle is handled from remote-control console. Interlocks prevent accidental exposure to personnel.



REVEALS FLAW: Multitron shoots through casting of bonnet for liquid oxygen service to reveal flaw due to internal shrinkage. Film makes permanent record.

SMALL BUT VITAL: Exposure points up tiny flaw in 4-in. yoke of cast steel valve body, a cause for rejection in atomic power plant service.

Multi-Machining Unit Takes On Jet Engine Maintenance

A lot of machining is needed to keep a fleet of 58 jet airliners in service.

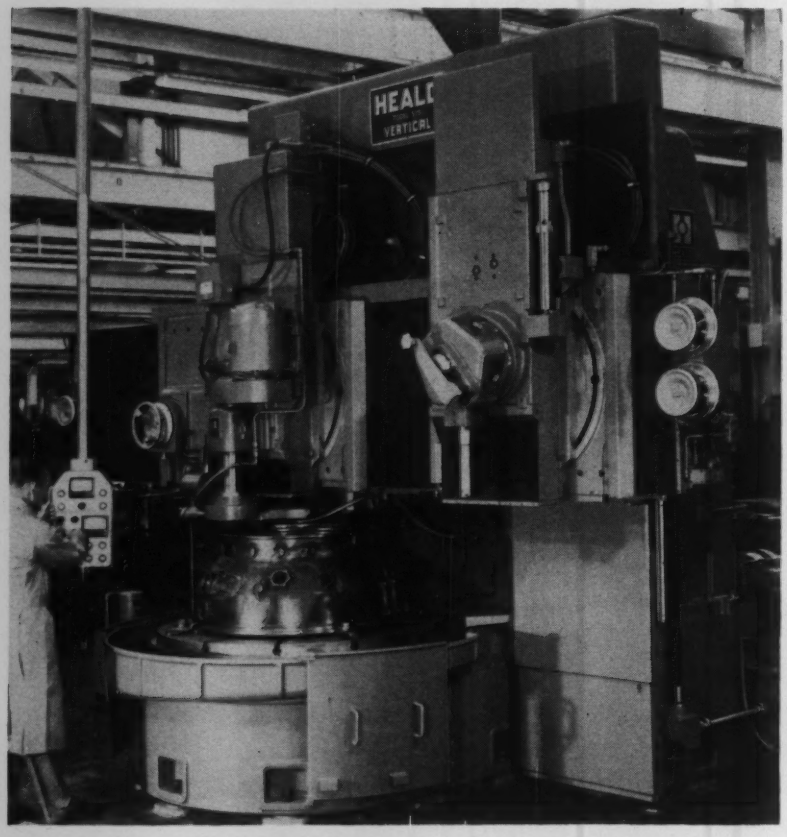
One company uses a single machine for grinding, boring, facing and turning engine parts.

▪ United Air Lines is simplifying jet engine overhaul at its new maintenance base in South San Francisco. The job is being done with a single vertical machine that can grind, bore, face and turn.

Big enough to take on such large parts as turbine engine difuser cases, the machine can handle work up to 52 in. in diam and 48 in. high. The unit was built by The Heald Machine Co., Worcester.

Just how versatile is it? Scan the list. It grinds tips of rotor blades. It turns ID's and shoulders of aluminum rings in stator blades. The Model 578 unit also turns and grinds stainless difuser case joints. And it even grinds bearing seats on shafts and in rotor shaft bores.

Other jobs include grinding of planimeter rings for checking the shape of sheet metal sound suppressors; grinding of holding fixtures used on the machine; and the grinding of tips of bushings in a ring jig. These parts are used to locate the 80 ventilation holes inside the big difuser casing.



MULTI-PURPOSE UNIT: Vertical machine handles a variety of grinding, boring, facing and turning jobs for jet engine overhaul.

Big and Gentle — Built to machine the wide size range of jet parts, the machine measures 15 ft in both height and width and is 12 ft deep. Tipping the scales at 25 tons, the giant vertical has the swing, rigidity and travel needed to handle both large and small aircraft parts with equal ease.

The new unit is the most versatile unit in its class ever made by the builder. A leading feature is a 10-ton slide assembly that combines both grinding head and metal cutting turret.

According to R. A. St. John, Heald vice president and general sales manager, "The five-position turret cutting compound, used primarily for roughing, holds five single-point tools for boring, facing, turning and associated operations. The grinding head is used for finishing face grinding."

The Work of Two—To get the same efficiency by another setup, the user would have to work with several machine tools. It would require either a vertical grinder or a gap-type internal grinder. Also, one lathe. But since these units employ horizontal spindles, there would be a real problem in mounting the larger parts.

On the other hand, the 578 can use a 40-in. diam roller thrust bearing under the worktable. Such a setup just wouldn't be practical in a horizontal machine.

The Heald machine has its work cut out. United has 40 Douglas DC-8's and 18 Boeing 720's. They'll make up the airline's Jet Mainliner fleet. However, United feels that its 128-acre maintenance

base will keep jet engine overhaul down to a minimum.

In Come the Engines — Here's how the maintenance system works. The Pratt & Whitney engines come into the turbine overhaul and test section where they're stripped right down to individual parts. They're then cleaned thoroughly.

Soon after inspection, the stainless cases move to the Heald vertical for turning and boring operations. First, worn and pitted areas are leveled by chrome plating. Then finish grinding (up to 6000 sfpm) restores each part to its proper dimension. The shop maintains tolerances of 0.003-in. and 15-rms finish.

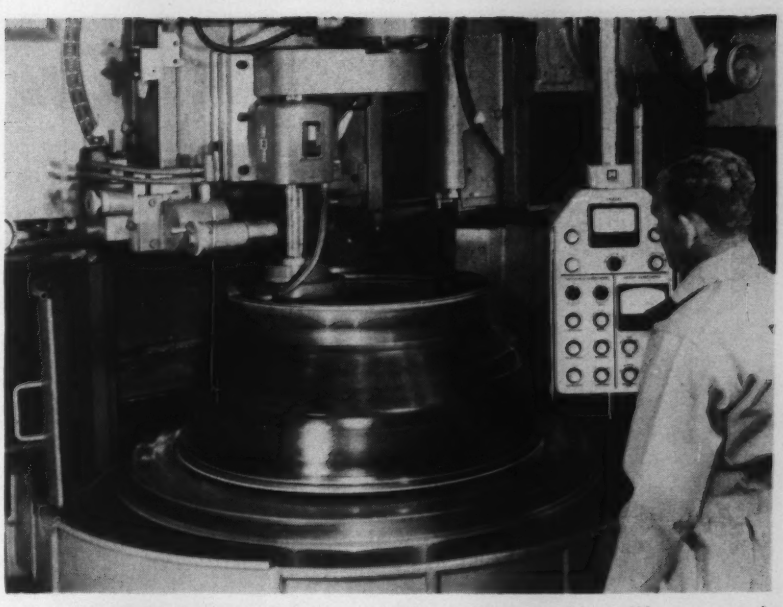
Difuser cases are held on the table by four chuck jaws. Rotor and stator rings are clamped on the table with hold-down clamps between sheets of ¼-in. thick rubber centered on a steel stud. This prevents distortion during grinding.

Slide Movement—Slides can be positioned vertically by raising or lowering the cross rail. Both grinding and turret slides can be independently positioned horizontally along the cross rail. And each slide can be set for a predetermined length of stroke up to 20 in. The worktable can handle face grinding of 4-ft long shafts.

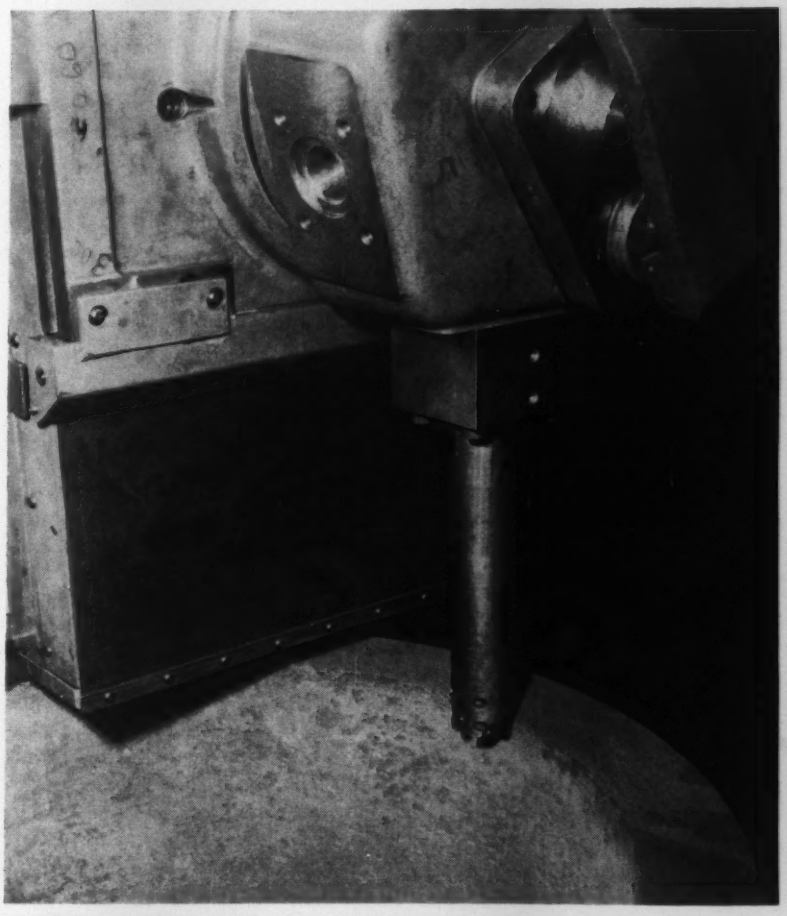
Table speeds range from 2½ to 180 rpm. The slides reciprocate either automatically or manually at a rate of 0 to 10 fpm. Both cutting and grinding slides have 20-in. travel. Also, they can swivel 45° to either side of vertical for angular work.

Variable speeds and feeds can be remotely controlled from a pendant while the machine is running. The operator can raise or lower the pendant 24 in. and swivel it to any position, even to the rear of the machine.

As far as the control system is concerned, speeds are controlled hydraulically from a remote site by electrically-actuated throttles.



BIG GRINDING JOB: Grinding of big stainless turbine difuser case is remotely-controlled from a pendant while machine is operating.



STARTING THE CUT: Vertical boring mill part gets heavy cut from Heald machine. Unit combines grinding head and metal cutting turret.

PRIZE WINNER: Czech inventor (left) explains the principle of his magnetic scale device to two visitors from Britain. Engineered at Vuoso, the invention was awarded a Czechoslovak state prize.

How Soviet Research Spurs Machine Tool Output

The Kremlin knows the value of research — the more the better. Satellite countries are also in on the act.

Central research stations design the equipment and the procedures needed.

▪ Current production of machine tools in the Soviet Union is reaching dangerous heights. Russia is said to be the only nation in the world that is mass producing these tools. Price tags on general purpose lathes are 62 pct lower than prevailing prices in Western Europe.

There's a secret to Soviet success. It lies in research. Russia has a network of research labs geared to get the very utmost out of production lines. The labs are well equipped and are staffed by top scientists. The bigger plants have their own research programs to supplement central research.

Key names in the central plan are Enims and Tsnitmash. The former is the Experimental Scientific Research Institute for Machine Tools. Tsnitmash stands for the Central Scientific Research Institute of Technology and Machine Building.

Team of Experts—A delegation from the Production Engineering Research Assn. of Great Britain recently spent five weeks touring the Soviet Union, Poland and Czechoslovakia. This team inspected Enims and Tsnitmash along with several other research centers. Led by Dr. D. F. Galloway, Director of PERA, their report is eye-opening.

Enims is concerned with basic and applied research on machine tools. This plant works largely with prototypes. It designs, tests and develops them. It also works on machine tool automation.

The institute is staffed by 1800 people—half in research and half in development. About 50 pct of the research and design staff are women. At present, Enims is adding a 50,000-sq ft, four-story building to its existing setup.

Other Research — Metal cutting, machine tool devices, hydraulics, electronics and electrical equipment

Russian Machine Tools

This is the second of a two-part series of articles on machine tool production in the Soviet Union.

The first article appeared in the Mar. 10 issue.

are other subjects of research at Enims.

The institute also maps out the plans for Soviet industry. This includes the number of machines required throughout Russia. And when special machine tool factories are needed, it's Enims' job to plan their erection.

Just to make sure that quality control is a byword at the institute, outside inspectors make frequent visits to the center. The tools designed must comply with standard test charts under threat of prosecution.

Enims has worked up a system of planned maintenance. It is said that this system has yielded an annual saving of 280 million rubles in wages (very roughly, about $40 million). This plan has also reduced idle machine time in Russian industry by 45 million hours.

New Machine — What has this center produced? Enims has developed an electro-impulse machining technique. This method removes metal 8 to 10 times faster than electro-spark machining, with an electrode life 10 to 100 times longer.

Twenty-five of these units are now in service throughout the USSR. One aircraft plant in Leningrad claims that this technique alone is saving the factory 1,500,000 rubles per year (again, about $200,000).

Near Moscow — The other research giant, Tsnitmash, is on the outskirts of Moscow. Tsnitmash is larger than Enims; it is staffed by 4400 people. This force is divided into three main research fields.

One group is engaged in production research and another on research and development of engineering materials. The third force works in the institute's Perovsky Experimental Production Plant.

Tsnitmash aims to improve current production processes and, of course, develop new ones when needed. Research is also carried out with metalworking equipment, like rolling mills, and the development of new materials for heavy industry.

Effective Size—Much of the success at Tsnitmash is traced to working forces of optimum size. Individual departments seldom, if ever, exceed 200 people.

Tsnitmash derives its income from two sources. Half of it comes from the State. The balance comes in the form of payment for research sponsored by industry. The institute provides direct assistance to about 400 plants.

One of the pet developments at Tsnitmash is a 70,000-ton hydraulic press. This unit now produces components for aircraft. Columns of this press are nearly 100 ft high.

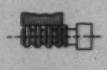
Extrusion Press—Equipment for cold extruding aluminum has also been produced. This press has turned out extrusions up to 2 ft in length, including a solid bar with helical external fins. In fact, the institute has even been able to extrude an aluminum sheath over an aluminum rod at speeds of 1000 fps.

Another piece of new equipment finish-rolls turbine blades to very close tolerances. Conventional forging can keep the limits within 1/16 in. But the new press can hold tolerances to within 0.004 in.

Other subjects of study include milling of high-strength steels and advanced work on ceramic tools.

Labor Shortage — Russia has a labor problem. The trouble is there's not enough of it. So automation fits into the scheme very nicely. Labor

How Centerless Grinding Improves Surfaces

COMPONENT	PLUNGER SLEEVE	INJECTOR BODY	PLUNGER	SLEEVE	STUD
OPERATION					
Conventional wheel speed, fps	95	124	123	108	115
IMPROVED wheel speed, fps	131	151	151	154	146
Conventional component speed, fpm	49	49	59	—	49
IMPROVED component speed, fpm	98	98	59	—	59
Saving in machine time, pct	50	60	47	30	44
Increase in one-shift production, pct	41	25	22	20	38
Conventional wheel life, no. of components	80	30	50	10	—
IMPROVED wheel life, no. of components	100	70	70	40	—

HIGH-SPEED GRINDING: Russian tractor plant uses high-speed centerless grinders to improve surface finishes. The method also helps to double grinding wheel life and cut machining time in many setups.

displaced by newly-introduced automation is either quickly absorbed or moves into a nearby plant.

That mere fact prompted Mr. Khrushchev to assign top priority to the development and introduction of new machinery and technology. This area comes first, says Mr. Khrushchev, "financially, materially and technically."

Automation is not new to Russia. Enims designed the first automatic line in 1935. An automatic line for machining tractor cylinder heads was tested in 1946.

Piston Line—By 1950, one auto plant used automation to produce pistons. Raw material entered one end of the piston line. Matched sets of cast, machined, inspected, greased and packed pistons came out the other.

Other automatic lines have since been built to produce bearings and for machining rotor shafts for electrical motors, gears and splined shafts for machine tools.

A good example of what this has meant to the Soviet Union is the rotor shaft line. It has doubled output, increased output per man 1000 pct and cut production costs in half.

Outside Help—Not all developments come from Russia. Czechoslovakia, Poland, China and other satellite nations, also contribute to the cause. Regular meetings among research groups from many countries result in the swapping of useful knowledge.

In the field of machine tools, Czechoslovakia is an important member of the Soviet bloc. Its Machine Tool and Metal Cutting Research Institute, known as Vuoso, has a staff that numbers over the 300 mark. About 150 of them work on machine tool research. Fifty of them are employed in metal cutting.

Another group is studying high-frequency heating techniques and equipment. And some 20 engineers act as trouble-shooters. They advise industry on machine tools and metal cutting techniques.

One of Vuoso's developments has been a magnetic scale used to check accuracy in gears and gear trains, or to determine errors in gear manufacturing machines and angular measurement. It can also measure lengths of travel.

During Heavy Runs — Measurements can be made under heavy-duty operating conditions. For instance, gear ratios of up to 1:1000 can be checked with an accuracy that exceeds 0.5 seconds of arc.

Machine vibration is another topic of study in the Czech institute. Research into carbide tools is aiming to reduce the number of carbide tools used in Czechoslovakia from five to three. It's also attempting to increase the number of grinds per tool from about 7 to nearly 20.

The Metal Forming Research Institute has only been in existence for six years. Yet the institute's 150-man force has already succeeded in reducing the cost of drills by 30 pct through cheaper materials.

There are several research centers in Poland, too. One of them, the Institute of Metal Cutting, deals mainly with problems of lubricating and cooling tools. This group has recommended the use of two types of ceramic tips for large scale production. Both types were developed by the institute.

Eagle Eyes — Just to make sure that vital data won't slip by unnoticed, the Soviet Union employs a full-time staff of 1800 scientists and translators. This cadre is assisted by 20,000 part-time workers. Their job: Keep up with foreign developments.

This huge force translates and abstracts articles from 10,000 foreign journals printed in 88 countries and in 64 languages. This center also publishes (twice a month) a journal on production engineering. This work covers about 4000 abstracts.

Dr. Galloway knows full well how rapidly the Russians are advancing. But he points out that it should be treated as a challenge, not a threat. Nevertheless, to meet this challenge will require "an extensive reappraisal of the present situation by governments, managements, scientists, engineers, workers and workers' representatives."

METAL CUTTING: Workshop in Poland researches into improved and new metal cutting techniques. It also studies lubrication and coolants.

CRAFTSMAN AT WORK: Private offices for die grinders insure high precision production of magnetic core parts for the electronics field. Individual offices are sound-proofed and air-conditioned.

Private Rooms Aid Die Grinding

It takes a skilled craftsman to produce precision parts for the electronics industry.

The best way to keep good talent on the job is to insure modern working conditions.

▪ Any precision product must have two ingredients. A high level of quality must be maintained. And to insure that this is the case, skilled craftsmen must be on the job. Thinking management knows these facts only too well.

As the trend toward miniaturization continues, the arts of die making and grinding become more valuable. At Magnetic Metals Co., Camden, N. J., magnetic core parts are made. And these parts must stand up to the quality test.

Be Modern — The Camden company knew that working conditions meant a great deal to product quality. Starting in 1956, it began remodeling the tool room. The plan? Put the men in their own individual quarters. The result? Clean, private and quiet areas for each grinder.

The company tested the plan for two years. One experimental booth was built. Each skilled workman spent several months in the booth, trying it out for size. Final improvements were obtained from the suggestions of the workmen themselves.

Comforts of Home — Now every skilled workman has his own room, somewhat plush but very practical. Picture windows, sound proofing and air conditioning are all part of the scheme. Workers are not disturbed while they work. Nor is dust a problem on close-tolerance parts.

It's not unusual for the grinding to get right down to tolerances as close as 0.00005 in. To help such work, there's a luminous ceiling of high output fluorescent lighting. It's both uniform and shadow-free.

Each booth is equipped with grinding machine, work bench, gaging devices, special tools and fixtures. Every workman has his own name-plate on the sliding door of his booth. If needed, the door can be locked.

The Whole Plant—The emphasis on good work quarters does not end with surface grinders. It extends to other parts of the plant, too.

Up-to-date inspection devices and modern metal turning and boring machines are used by the company to produce precision dies. And a rigid maintenance schedule for lamination stamping equipment is part of normal production practice.

As soon as dies deviate beyond 0.0001 in. from spec, they must be sharpened. All dies whose value exceeds $25,000 in materials and workmanship are stored in moisture-proof vaults.

Continuous Casting Puts Bronze To Work in Tough Service

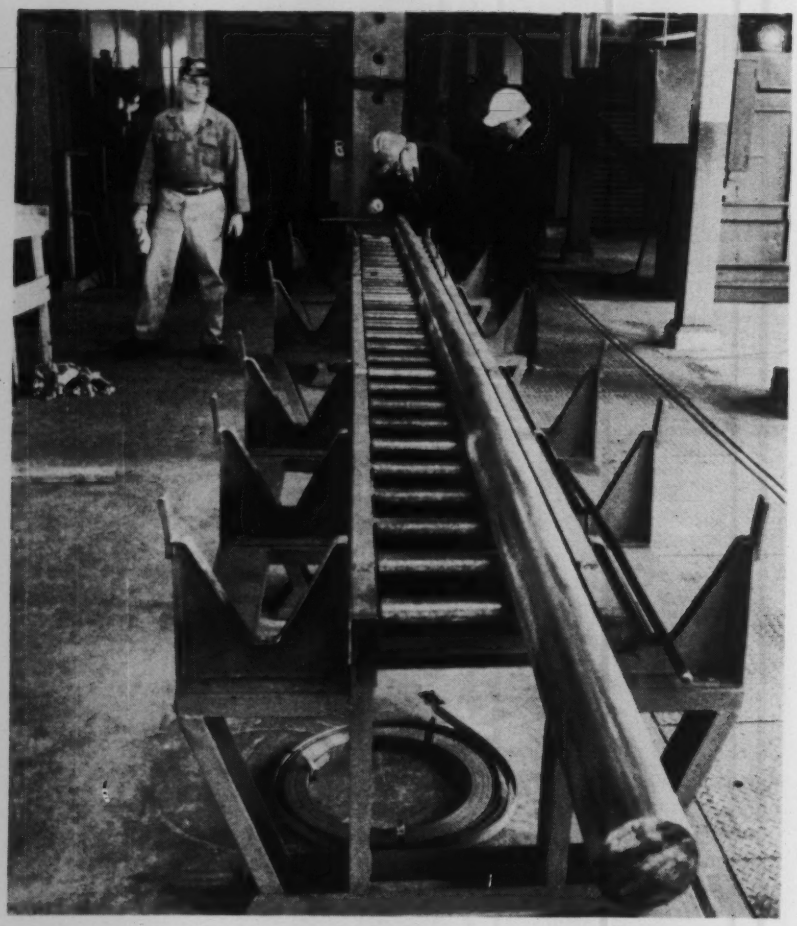
Engineers swung to bronze to operate nine sluice gates in a flood control project.

This alloy resists corrosion and can be treated to the proper strength. Also, it's machinable.

▪ Chicago's flood control project owes much of its success to nine continuously - cast bronze stems. They are used to operate the sluice gates of the Lockport, Ill., power house.

These 20-ft long stems are each 4½ in. in diam and weigh 1300 lb. It is said to be the first time that such large sizes have ever been attempted by the continuous casting process.

Project engineers decided to abandon three turbines (1907 vintage) at Lockport. They replaced the turbines with the nine sluice gates. In doing so, they were able to step up the storm water discharge rate, a vital move in the project, by 300 to 400 pct.



BRONZE CASTING: Each 20-ft long casting received a thorough quality check to determine its fitness to undergo further processing.

Gate Design—Plans were drawn for the gates, each 9 ft wide by 14 ft high, and able to withstand a 24-ft head of water. The gates were to be raised and lowered electrically by a control unit. This would transmit a lifting torque through a nut to a threaded stem attached to the gate itself.

John Mohr & Sons, Chicago, took care of the engineering, fabrication and installation of the nine sluice gates. Of prime importance were the stems which would hold, open and close these gates. Unsupported along its entire length, each stem would have to bear a combined torque and axial load of 2500 ft-lb and 56,000 lb, respectively.

The search for the proper stem alloy was important. It not only had to be strong but corrosion resistant as well. Manganese bronze was strong enough, but too high in zinc. The highly-alkaline waters would subject it to dezincification.

Would Stainless Do?—Stainless steel, on the other hand, filled the bill on both counts. However, machining of this material would have been much too expensive. But International Nickel Co., New York, had developed an alloy, one of the Ni-Vee bronzes, that solved the problem.

Since this alloy contained only 2 pct zinc, it was not subject to dezincification. And with proper heat treatment, it could be brought up to the required strength.

American Smelting and Refining Co., Continuous Cast Products Dept., Barber, N. J., handled a key step in the processing, the continuous casting of the alloy. A big factor was Asarco's guarantee that it could attain fine tolerances.

PRECISION THREADS: While the tool machines final thread cut, a cylindrical gage checks the accuracy.

They would be so fine that the need to machine the stems before threading would be eliminated.

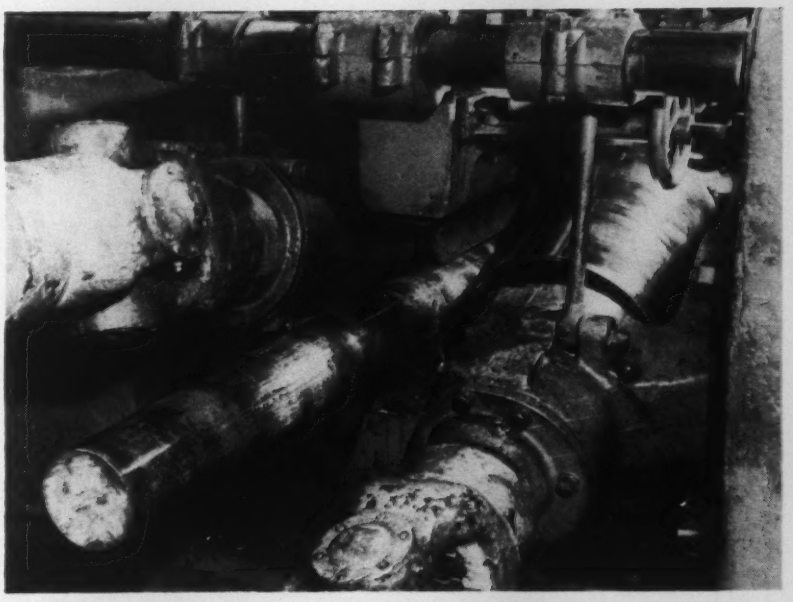
Careful Casting — Manufacture of the bronze rods required precise casting methods. Then, too, accurate controls were needed during annealing, straightening and heat treating.

The rods were cast and cut to 20-ft lengths at Asarco's plant in Perth Amboy, N. J. Sample wafers were then taken from the ends of each rod. The company's Central Research Lab checked each sample to make sure they conformed to chemical and metallurgical specs. Also, that they would respond to heat treatment.

The next step was heat treating. This took place at Benedict-Miller Co., Lyndhurst, N. J. Each rod was heated to a uniform temperature of 1400°F for eight hours, then quenched in oil.

Flexing the Rods—Heat treating made the stems very soft. As such, they were easily straightened on a Medart machine. On this unit, the rods were flexed between contra-angled convex and concave rollers.

Benedict-Miller took over again and reheated the rods to 600°F for about 16 hours. The company gave frequent checks on more sample wafers for hardening. The rods were then precipitation hardened in a slow air cool.



SET THEM STRAIGHT: Annealed rods pass through the contra-angled Medart rollers where they're moved back and forth several times.

The rods went back to Perth Amboy where they were given a final straightening on a Watson-Stillman hydraulic press. When finished, the stems were aligned to 1/16 in. of true per 5 ft segment, and ¼ in. in the full 20-ft length.

Properties — Asarcon Ni - Vee bronze contains 88 pct copper, 5 pct tin, 5 pct nickel, 2 pct zinc and 0.01 max pct lead.

After heat treatment, the stems had a yield strength of 69,000 psi. Their tensile strengths ranged from 75,000 to 90,000 psi, elongation was 6 to 9 pct and the average Brinnell hardness was 250.

The continuously-cast stems are now in service in the Lockport project. The process has provided the stems with uniformly fine grain microstructures. They are also free from porosity and dross inclusions. They're expected to lead long life.

Modern Data Acquisition System Classifies Tinplate Coils

With a tinplate line operating at 2000 fpm, an automatic inspection system grades the coils—and records all defects.

Recorded data include: total coil length; length of prime, seconds and waste tinplate; and the length of each defect.

▪ Completely transistorized, a data acquisition system boosts quality control in the manufacture of tinplate coils. The system has become a vital link in the control of high-quality metal for use in making tin cans.

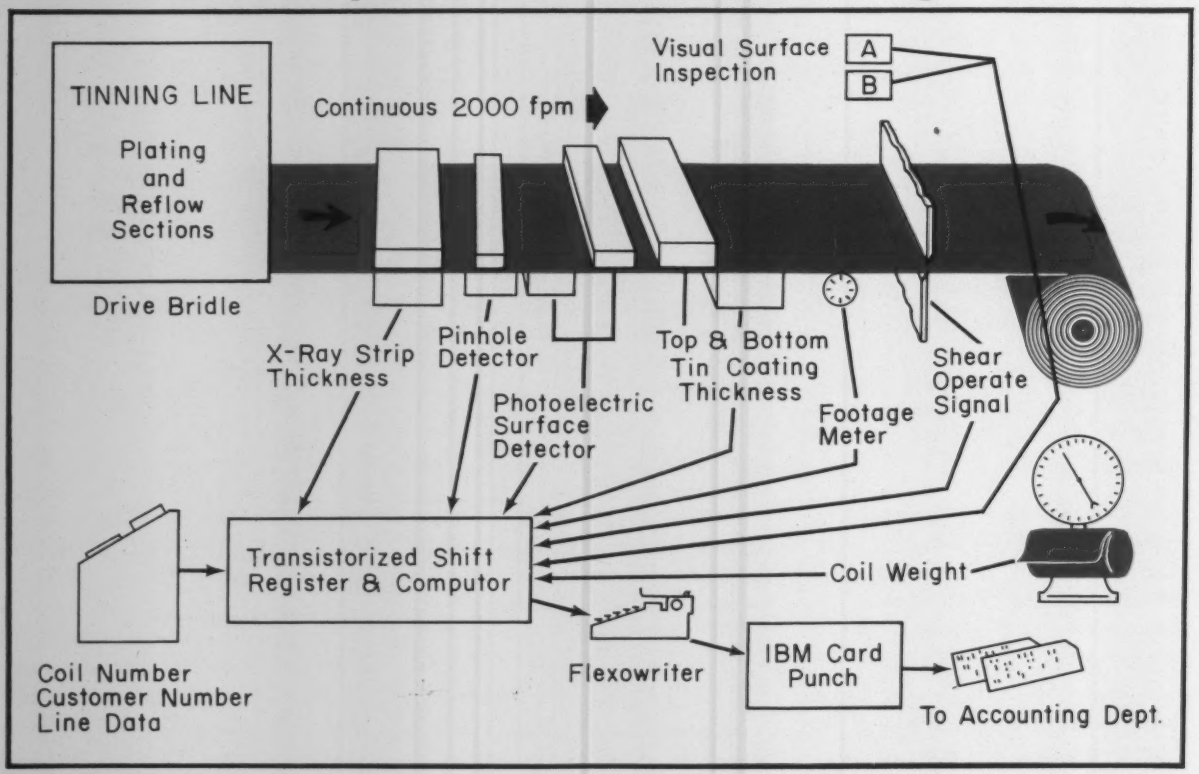
First installation of the new system—which records defects and determines the grade of tinplate coils—is at the Jones and Laughlin Steel Corp., Aliquippa, Pa. This unit has been operating successfully for about a year. Similar systems have since been installed by other tinplate makers.

Simultaneous Record—With the tinplate line operating at 2000 fpm, the Automatic Inspection Data Accumulator (AIDA), made by the General Electric Co., Schenectady, N. Y., records data from a footage meter, strip thickness X-ray gage, pinhole detector, top and bottom coating thickness gages, and a visual inspection station. The unit records and processes all data at the same time.

Output data provide complete records of tinplate quality. Records include: total coil length; length of prime, seconds and waste tinplate; and length of all defects —such as pinholes—detected in each coil. When a coil is completed, all data are correlated and summarized by the AIDA unit. Summary data are fed into an electrical typewriter and card punch: This provides permanent records for visual inspection or computer analysis.

Spokesmen at J&L explain that

Here's How System Classifies Moving Coils



RAPID MOTION: The tinplate line operates at a continuous speed of 2000 fpm. Data recorded include complete records of coil quality. All defects, such as tiny pinholes, are noted and recorded on punch cards.

the current trend is toward shipment of large tinplate coils, rather than single sheets. This trend dictated the need for the inspection and data processing equipment.

Triggers Tachometer—In use, a pulse-type footage meter supplies basic coil length data to the system. The meter gives one output pulse per foot of tinplate. When any of the inspection gages notes a defect, an electrical signal closes a transistor gate. This action triggers a tachometer pulse counter.

As long as the defect is present, the pulses are counted and logged. Each defect adds to the previous count. Thus, the unit provides a total cumulative figure, readily available at the end of each coil run.

Logic circuits classify the tinplate according to its defects. The exact defect classification is flexible: It can be set to various needs.

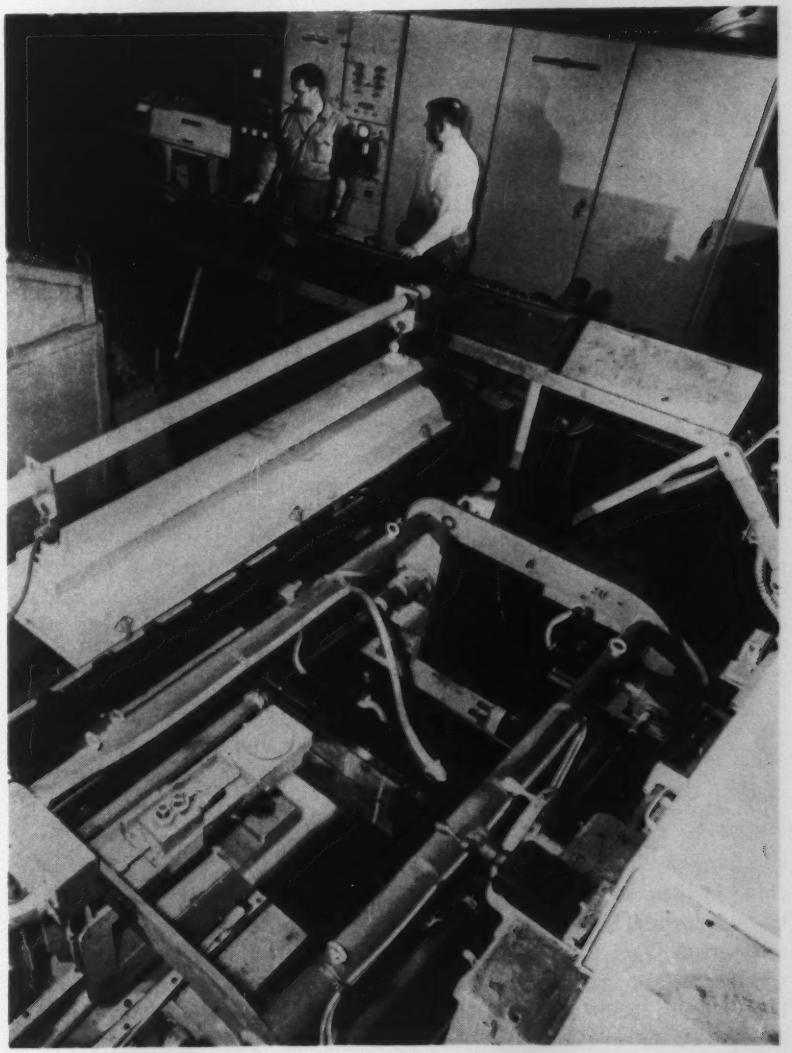
Permanent Data Storage—When a coil is done, the delivery-end shear operates. Stored information in the pulse counters is fed into a permanent transistor-storage register. The counters then reset to zero, well in advance of the next footage pulse produced by a new tinplate coil.

The finished coil moves from the winding reel to a scale. From the scale, weight datum is electrically fed into the AIDA unit. The electric typewriter prints out this datum and punches the record into standard business machine cards, along with other information already recorded.

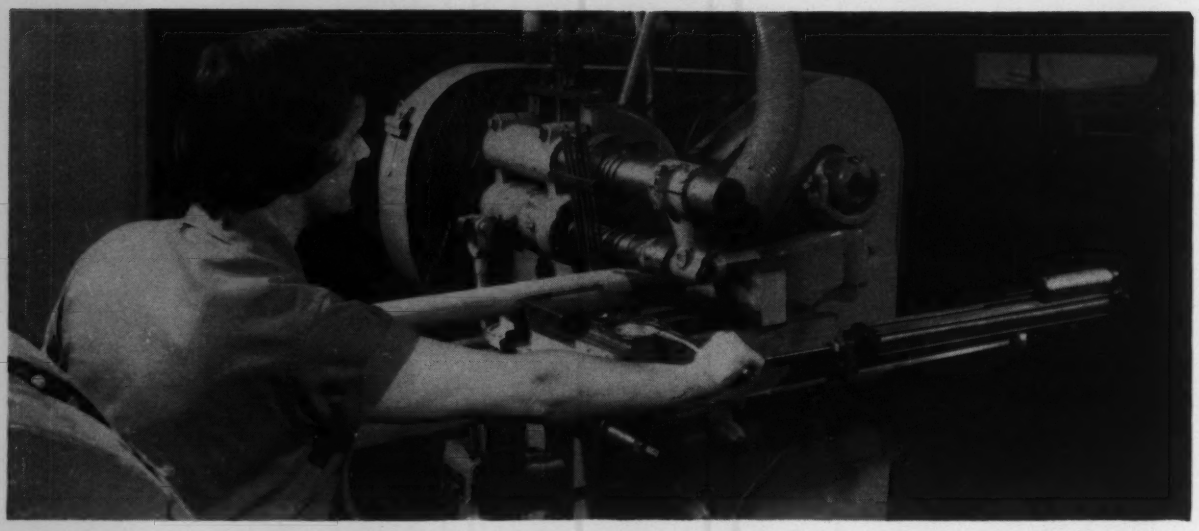
GE took full advantage of the long-life and reliability of transistors, printed wiring and heavy-duty industrial parts in designing the system. All controls are mounted in an enclosed, mill-type panel. A standard air conditioner provides temperature control for the unit.

The new system provides tinplate producers with complete records of coil quality. This makes possible more accurate control of the finish quality of large coils shipped to can makers.

CONTROL CONSOLE: A single operator handles controls at delivery end.



VISUAL INSPECTION: Workmen glance at strip as it passes through mill.



SPEED PRODUCTION: Electrically-actuated air cylinders allow hand mills to meet tight working schedules.

Modified Machines Speed Work

Adding Air Cylinders Aids Milling of Laminated Plastics

Simple changes in milling machines cut operator fatigue.

Modifications increase machine flexibility. The result is an increase in production.

▪ A few simple changes in a group of hand milling machines have increased their working output. The modifications consist of electrically-actuated air cylinders and hydraulic check devices.

Seventeen machines with such minor changes are in the milling department at the Synthane Corp., Oaks, Pa. These easy-to-operate machines turn out small parts made of laminated plastics.

Add Air Cylinders—Through the addition of air cylinders, the machine heads can be quickly moved up and down. This allows the operators to cut and trim parts at top speeds. It also permits automatic lateral movement of the tables, along with the vertical head movements.

The modified machines are Number 1 U. S. Mills, made by the U. S. Burke Machine Tool Co., Cincinnati. With the minor changes, made by Synthane, they meet tight working schedules because they're faster and more flexible than standard machines.

Each mill provides low-cost sawing, squaring, cut-off, drilling, short-run splining and milling operations of many types. Simple, heavy duty construction, coupled with few moving parts and the absence of gear trains, keeps maintenance costs low.

Cut Operator Fatigue—In addition, the machines free skilled manpower. Constant supervision of all manual operations of the hand mills is no longer needed.

Being easy to operate, the mills —equipped with the air cylinders —relieve strain on the operators. This cuts fatigue and further increases work output.

Among the small parts milled on the modified machines are bushings, breaker arms, spools for textile and photographic parts, shafts for the radio and television industries, screw slottings, coil forms and all types of insulators.

One of the current uses of the modified machines is milling of special air tubes. These tubes must be slotted for an automatic X-ray processing system.

Special Adaption—Synthane has adapted one of the machines to cut a long slot in Grade LB (fabric base) laminated tubing to form the air tubes. They've lengthened the mill table 7 in. for this part.

Specifications call for a 22-in. slot, 0.040 in. wide, through a ⅛-in. wall. The mill performs this work on two parts at the same time. Work can take place either manually or automatically.

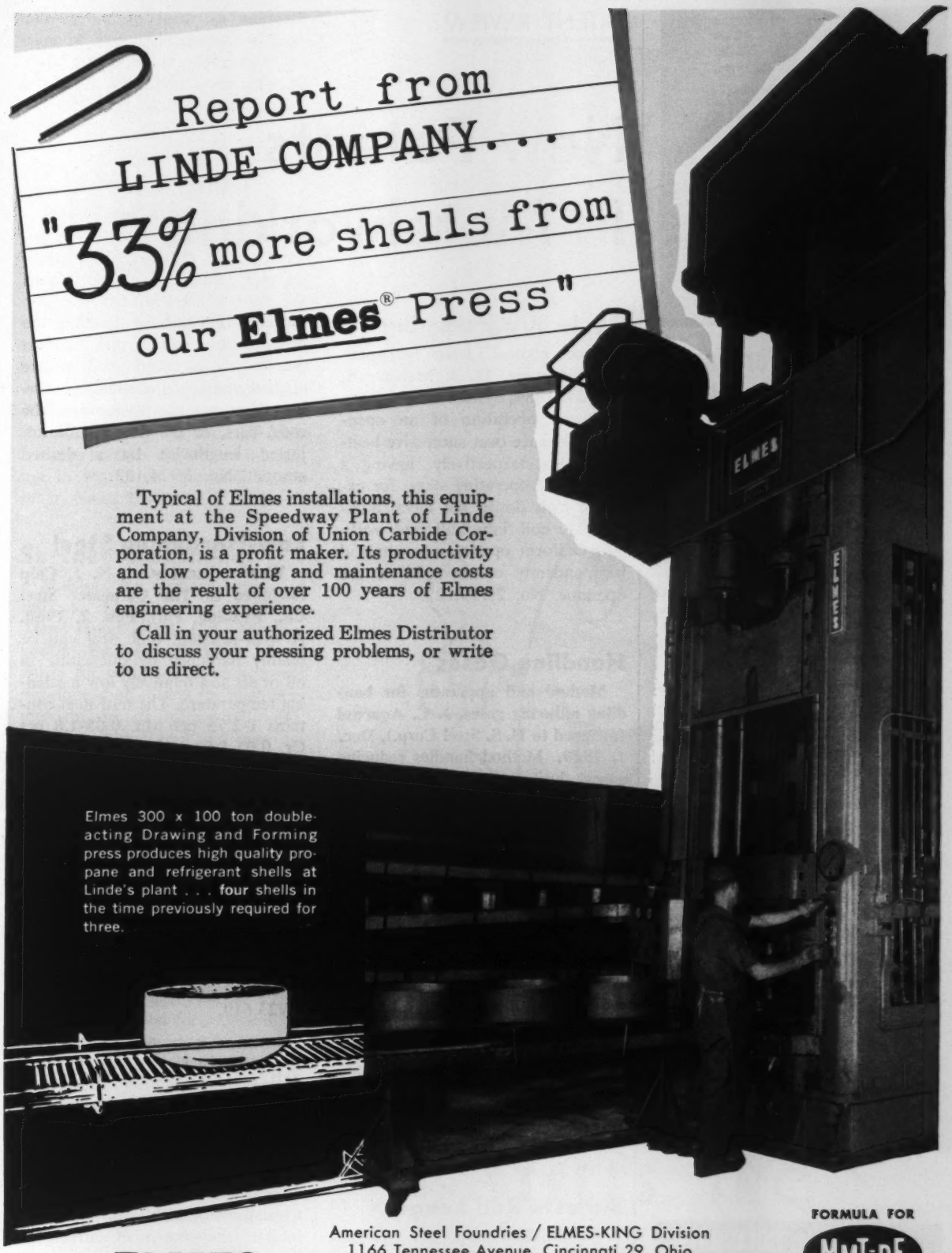
The hand mills, as purchased, have a wide range of spindle speeds from 150 to 5000 rpm. The drive is from the motor to the countershaft; then from countershaft to spindle, by means of a B section V-belt.

Report from LINDE COMPANY...

"33% more shells from our Elmes® Press"

Typical of Elmes installations, this equipment at the Speedway Plant of Linde Company, Division of Union Carbide Corporation, is a profit maker. Its productivity and low operating and maintenance costs are the result of over 100 years of Elmes engineering experience.

Call in your authorized Elmes Distributor to discuss your pressing problems, or write to us direct.



Elmes 300 x 100 ton double-acting Drawing and Forming press produces high quality propane and refrigerant shells at Linde's plant . . . four shells in the time previously required for three.

American Steel Foundries / ELMES-KING Division
1166 Tennessee Avenue, Cincinnati 29, Ohio

ELMES *Hydraulic Presses and Equipment*

KING Vertical Boring and Turning Machines

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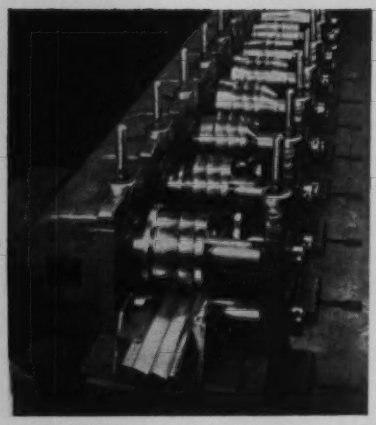


Yoder Roll-Forming Equipment mass-produces shapes accurately, economically

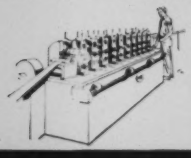
Yoder Roll-Forming Equipment, even with part-time operation, can effect significant savings in many metal working applications and industries. Shapes, simple or complex, can be quickly and economically produced the Yoder way from a wide variety of flat-rolled coated or uncoated stock ... in thickness up to ¾ inch ... in speeds up to 50,000 feet per day.

Yoder engineers flexibility and precision into metal forming operations. For example: many basic shape modifications, such as coiling, welding, notching, ring-forming, perforating, and cutting to length can be simultaneously accomplished with little or no additional labor cost.

Yoder also makes a complete line of Rotary Slitters and Pipe and Tube Mills. Profit from Yoder's years of engineering and service experience, contact your local Yoder representative or send for the Yoder Roll-Forming Manual.

This fully-illustrated 88-page book clearly discusses every important aspect of Yoder Roll-Forming Equipment and methods ... it's yours for the asking!

THE YODER COMPANY
5510 Walworth Avenue • Cleveland 1, Ohio



ENGINEERING YODER MANUFACTURING
COLD ROLL FORMING MACHINES

New Patents In Metalworking

Cycle Programming

Preset control system for open-hearth furnace, W. J. McConnell, Dec. 29, 1959. System for programming the operation of an open-hearth furnace over successive heating cycles, respectively, having a plurality of operating steps, for example melt down, hot metal addition, ore boil, lime boil, and working. Uniform operation is attained independently of the skill of the operator. No. 2,919,122.

Handling Gases

Method and apparatus for handling reducing gases, J. C. Agarwal (assigned to U. S. Steel Corp.), Dec. 1, 1959. Method handles reducing gases during direct reduction of iron oxide ores, wherein recycled gas is pressurized by inherent pressure, rather than by an outside energy source. No. 2,915,379.

Deformation of Metals

Process for facilitating the plastic deformation of metals, F. Singer, Nov. 24, 1959. To form tightly adherent sulfide coatings on ferrous metals, the dry metal is exposed to the action of hydrogen sulfide and oxygen. The metal may then be effectively cold drawn or extruded. No. 2,914,432.

Adjusts Rod Length

Cooling-bed stop, M. Morgan and E. R. Comtois (assigned to Morgan Construction Co., Worcester, Mass.), Feb. 9, 1960. Design for a cooling bed for handling the product of a rolling mill wherein the lengths of rolled products are aligned and made coextensive during their passage thereover. The rods, bars, or the like can be adjusted lengthwise by a desired amount. No. 2,924,132.

Low-Hardening Steel

Wear-resistant steel, N. J. Culp (assigned to The Carpenter Steel Co., Reading, Pa.), Feb. 2, 1960. A wear-resistant tool steel can be readily hardened by quenching in oil or air at a relatively low hardening temperature. The tool steel contains 1-2.75 pct Mn, 0.05-1.8 pct Cr, 0.05-1.5 pct Mo, 1-2.5 pct C, 1.3-10 pct W, and the balance mainly Fe, with the sum of the Cr and Mo contents being at least 1 pct, and the proportions of W and Cr falling within prescribed limits. Substantial quantities of mono-tungsten carbide are formed in a hardened ferrous matrix. No. 2,923,619.

"Patent Review" appears in the third issue of The IRON AGE each month. Look for it in the April 21 issue.

Anti-Corrosive Coating

Method of forming a protective coating on ferrous-metal surfaces, D. G. Schweitzer, J. R. Weeks, O. E. Kammerer and D. H. Gurensky (assigned to U. S. Atomic Energy Commission), Feb. 23, 1960. To inhibit the corrosive attack of liquid heavy-metals on a ferrous-metal surface, the latter is brought into reactive contact with zirconium

and carbon to form an adherent layer of zirconium carbide. Thereafter, zirconium is maintained dissolved in the liquid metal in contact with the treated surface. No. 2,926,111.

Work-Roll Cooling

Method and apparatus for cooling rolling mills, F. E. Davis (assigned to U. S. Steel Corp., Pittsburgh), Jan. 19, 1960. Greater efficiency and more uniform cooling of work rolls are produced by retaining the cooling water in contact with the roll surface, for a comparatively long period of time. A stream of water is caused to flow in an axial direction over the roll's working surface, the stream increasing in size from one end to the other. No. 2,921,488.

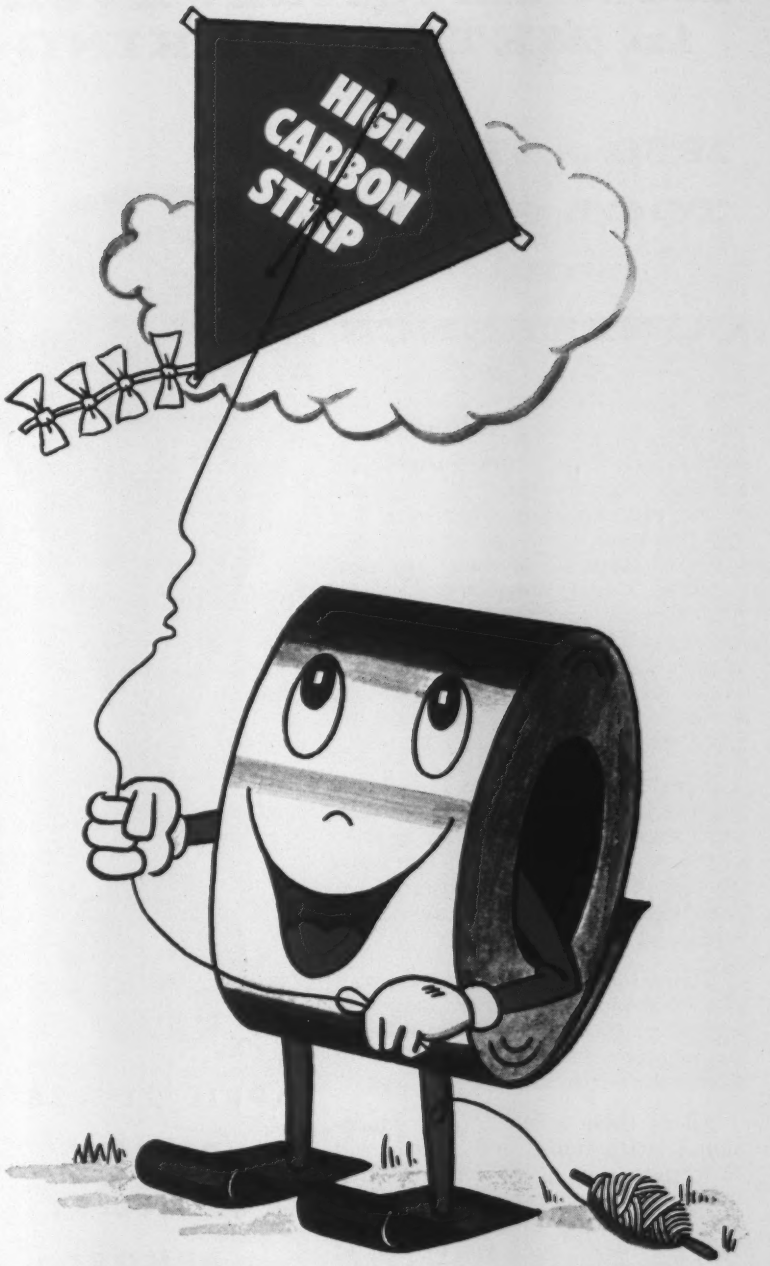
Surface Machining

Machine for cutting designs on rolls, L. J. Ehlinger (assigned to Alan Wood Steel Co., Conshohocken, Pa.), Feb. 9, 1960. Mechanism for obtaining more accurate positioning of cutters in machining the surfaces of rolling-mill rolls, and permitting rapid and very accurate registry of successive machining points in reference to other machining points, both angularly and longitudinally, as well as diagonally. No. 2,924,153.

Metal Extraction

Process for obtaining metals from their ores, F. G. Pearce (assigned to Pan American Petroleum Co., Tulsa, Okla.), Feb. 2, 1960. In a direct method for recovering a refined pig-iron product from either high- or low-grade iron oxide ores, a mixture of carbon monoxide and hydrogen is forced continuously through the molten bath. Coke is not required, and under the conditions of the process the reducing efficiency of the gases is substantially at a maximum. No. 2,923,-615.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.



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FREE LITERATURE

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, p. 121.

Logging System

A two-page application data sheet describes a 100-channel, sequential data-logging system. The data system records the test results of components being exposed to nuclear radiation. The operation of this equipment is explained with the aid of a schematic diagram and a description of the system. Complete specifications are listed, including modes of operation, time per channel, visual displays, and channel switching. (Leeds & Northrup Co.)

For free copy circle No. 1 on postcard, p. 121

Pumps and Controls

Full design details on a complete line of hydraulic pumps, fluid motors and valves are contained in a 72-page catalog. Special sections, devoted to each component in the line, discuss the design and operating characteristics of each, with cut-away illustrations in color. Tables of typical performance data for individual pump or control units appear throughout the catalog. (Denison Engineering Div., American Brake Shoe Co.)

For free copy circle No. 2 on postcard, p. 121

Loss Detector

Information and data on an adhesion-loss detector is contained in a short bulletin. The detector is designed to reduce railroad operator's long-standing and costly problem of undetected wheel slips. The four-page booklet describes the new device that detects axle revolutions per minute to note differences between axle speeds, so that manual or automatic adjustment can be made to correct the slip over the entire operating range of the locomotive. (General Electric Co.)

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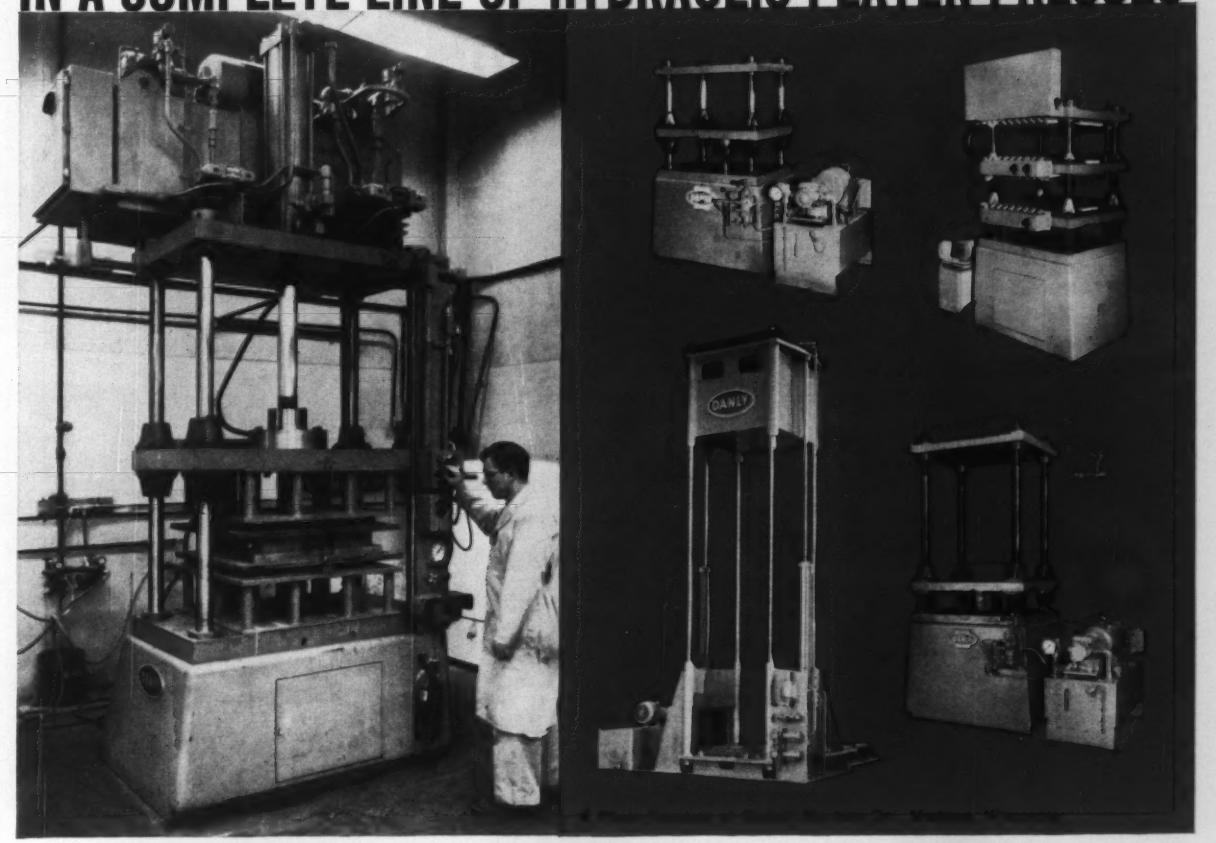
GET DEPENDABLE DANLY PERFORMANCE IN A COMPLETE LINE OF HYDRAULIC PLATEN PRESSES



Danly Hydraulic Platen Presses offer you the extra precision and brawn for which Danly equipment is known throughout industry. Danly presses are engineered to the highest machine-tool standards with design innovations which add the extra measure of performance you want.

You'll find top precision in the long-wearing alloy steel columns, accurately-machined platen faces, and demountable bushings on Danly Platen Presses. Parallelism is held to tolerances equivalent to the finest Danly Precision Die Sets.

Danly Platen Presses are available with one or more moving platens, up-acting or down-acting. Capacities range from 5 to 500 tons. Variations in stroke, speed and pressures are offered as required. Heating elements and other accessories are also available. Your choice of electrical control or lever operation. Whatever you need in a hydraulic platen press you can obtain from Danly. For more complete details and specifications, write for your copy of the new catalog, "Danly Hydraulic Platen Presses."

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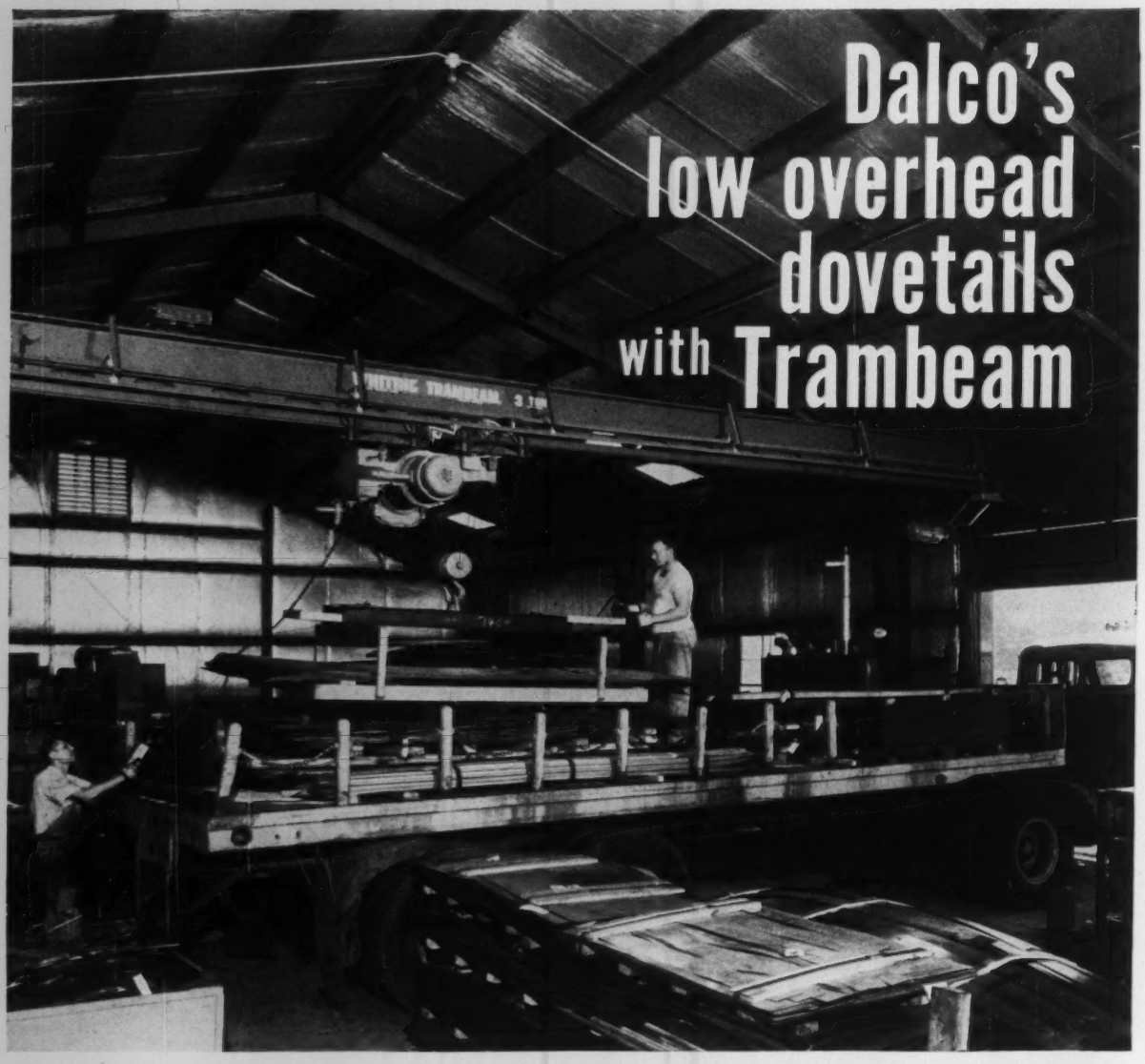

Dalco's low overhead dovetails with Trambeam

Dalco Metal Products Co. has achieved remarkable efficiency in its new metal fabricating shop at Crete, Illinois. It is an economical prefab with a low ceiling. Yet it easily accommodates a Whiting Trambeam Overhead Handling System. Running on underhung trucks, Trambeam crane rides high, and clears sloping roof beams by only 2". It puts maximum space to work, from the floor up, from wall to wall.

Greater material storage capacity permits quantity buying at a considerable savings. Trambeam serves during receiving, fabrication, shipping . . . speeds all three . . . cuts materials handling costs. By helping to *double* production, it has actually paid for itself within a year! For fresh ways to solve materials handling problems—for guaranteed service and quality—call on Whiting Trambeam!

FREE BULLETIN . . . "Ideas in Materials Handling"—typical money-saving Trambeam installations in production, shipping and storage. *Whiting Corporation, 15601 Lathrop Avenue, Harvey, Illinois.*

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MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

FREE LITERATURE

Continued

Money-saving products and services are described in the literature briefed here. Publications are free with no obligation. Just circle the number on the free postcard and mail.

Hydrogen Purifier

Separating hydrogen from other gases, a hydrogen-gas purifier is described in a two-page bulletin. Laboratory experiments requiring up to 10 cu ft per hour of ultrapure hydrogen, at pressures to 150 psi, make use of this unit. (Milton Roy Co.)

For free copy circle No. 7 on postcard

High-Pressure Pumps

A high-pressure line of sealless leak-proof pumps is described in a four-page, 2-color bulletin. (Chempump Div., Fostoria Corp.)

For free copy circle No. 8 on postcard

Non-Chattering Valve

A four-page bulletin describes a non-chattering, hydro-valve line for liquid service. The bulletin contains complete details and specifications on sizes, capacities, materials, and other pertinent data on the line of valves. (J. E. Lonergan Co.)

For free copy circle No. 9 on postcard

Small Tubing

The selection and use of stainless-steel tubing is the subject matter of a catalog. The tubing ranges from 33-gage hypodermic needle sizes to heavy-wall high-pressure tubing up to 5/8-in. OD. Complete, easily read tables give property data, sizes, tolerance, and weight information for all commonly-used shapes and sizes. (Posen & Kline Tube Co., Inc.)

For free copy circle No. 10 on postcard

Thermocouple Adapter

Described in a two-page bulletin is a spring-loaded, bayonet-lock thermocouple adapter. The adapter converts any 1/8- or 1/16-in. diameter, metal-sheathed thermocouple to a spring-loaded, bayonet-lock type with adjustable immersion lengths. Supplied are specifications, applications, and limitations at various temperatures concerning all parts of the adapter. (Thermo Electric Co., Inc.)

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Stock Packings

Extensive information is offered in a catalog concerning 14 types of fabric, foil, plastic, and filament packings. They are available in nine constructions, which are illustrated by large cutaway drawings in the catalog. The packings are specially designed for service with strong acids, corrosive fluids, solvents, gasoline, steam, and many others. They are used on pumps, valves, pistons, and other devices. General data, tables, lengths, weights, standard packagings and prices are included. (Greene, Tweed & Co.)

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Steel Cleaner

Highly efficient in both soak-tank and electrocleaning operations, a heavy-duty cleaner for steel is described in a bulletin. Only one product need be stocked for both cleaning operations. (Clarkson Laboratories, Inc.)

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Dryers and Ovens

A four-page bulletin illustrates typical installations for paint baking, heat treating, rubber, plastics, ceramic curing, and other similar applications. Also illustrated are typical oven material-handling setups. (J. O. Ross Engineering)

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Salt-Bath Furnaces

Illustrations of the advantages of graphite electrodes in salt-bath furnaces appear in an informative brochure. Uses include: aluminum dip-brazing, high-speed steel hardening, billet heating, annealing, solution heat treating, austemper-

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ing and martempering. (Salt Bath Furnace Div., Lindberg Engineering Co.)

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Analyzing Instruments

Gas-analyzing instruments, designed to aid the metals industry, are described in a four-page bulletin. The illustrated brochure provides complete details on four models. The instruments are designed to analyze and control heat-treating atmosphere components. These include dew point, hydrogen, methane, carbon monoxide, carbon dioxide, oxygen, and total combustibles. The bulletin outlines operational, maintenance, and construction features of the instruments, in addition to typical scale ranges and applications. Information on instrument-assemblies selection is also included. (Mine Safety Appliances Co.)

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Air Compressors

Selection of single-stage centrifugal compressors, up to 4-lb equivalent air pressure, can be quickly made by means of condensed procedures given in two bulletins. Included in the bulletins are lists of standard ratings, dimensions and list prices. (Allis-Chalmers Mfg. Co.)

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Jet Cleaner

Containing information on a high-capacity jet cleaner, for the inside of large tanks, a four-page bulletin describes its operation. Showing how the unit can discharge from 4000 to 9400 gph, the bulletin gives specifications and lists the accessories available for the water-driven unit. (Sellers Injector Corp.)

For free copy circle No. 18 on postcard

Bonding Compounds

An indexed data sheet lists a complete line of technical and industrial cements and bonding compounds. Also included are prices, characteristics, and a partial list of uses. (Sauereisen Cements Co.)

For free copy circle No. 19 on postcard

Toroidal Cores

Toroidal cores, wound from thin magnetic tapes, is the subject of a 24-page bulletin. The bulletin gives extensive design data, test data and magnetization curves for toroidal cores, stamped-ring cores, and precision die-cut laminated cores. Also included are test methods with circuit diagrams. (Magnetic Metals Co.)

For free copy circle No. 20 on postcard

Chain and Sprockets

A 56-page bulletin presents a complete line of roller chain and sprockets. The roller chain line includes single strand, double strand, double-pitch drive, double-pitch conveyor, and other types. Photographs and diagrams show construction details and advantages of sprockets for easy and secure mounting on shafts. Steel plates and bored-to-size sprockets are also listed. Complete with selection data and list prices, the bulletin includes general information on the installation of roller chain drives. (Dodge Mfg. Corp.)

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Resistance Bulbs

Two types of precision resistance spirals are discussed in a data file. The first resistance bulb is the glass enclosed type for high-precision temperature measurements in the range —220° to +550°C. A second type, suitable for temperatures to +750°C, is ceramic enclosed and of smaller diameter than the double-walled glass type. (Engelhard Industries, Inc.)

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Centrifugal Pump

Described in a brief bulletin is a small, low-cost centrifugal pump that cannot leak. (Dynapump Div., Fostoria Corp.)

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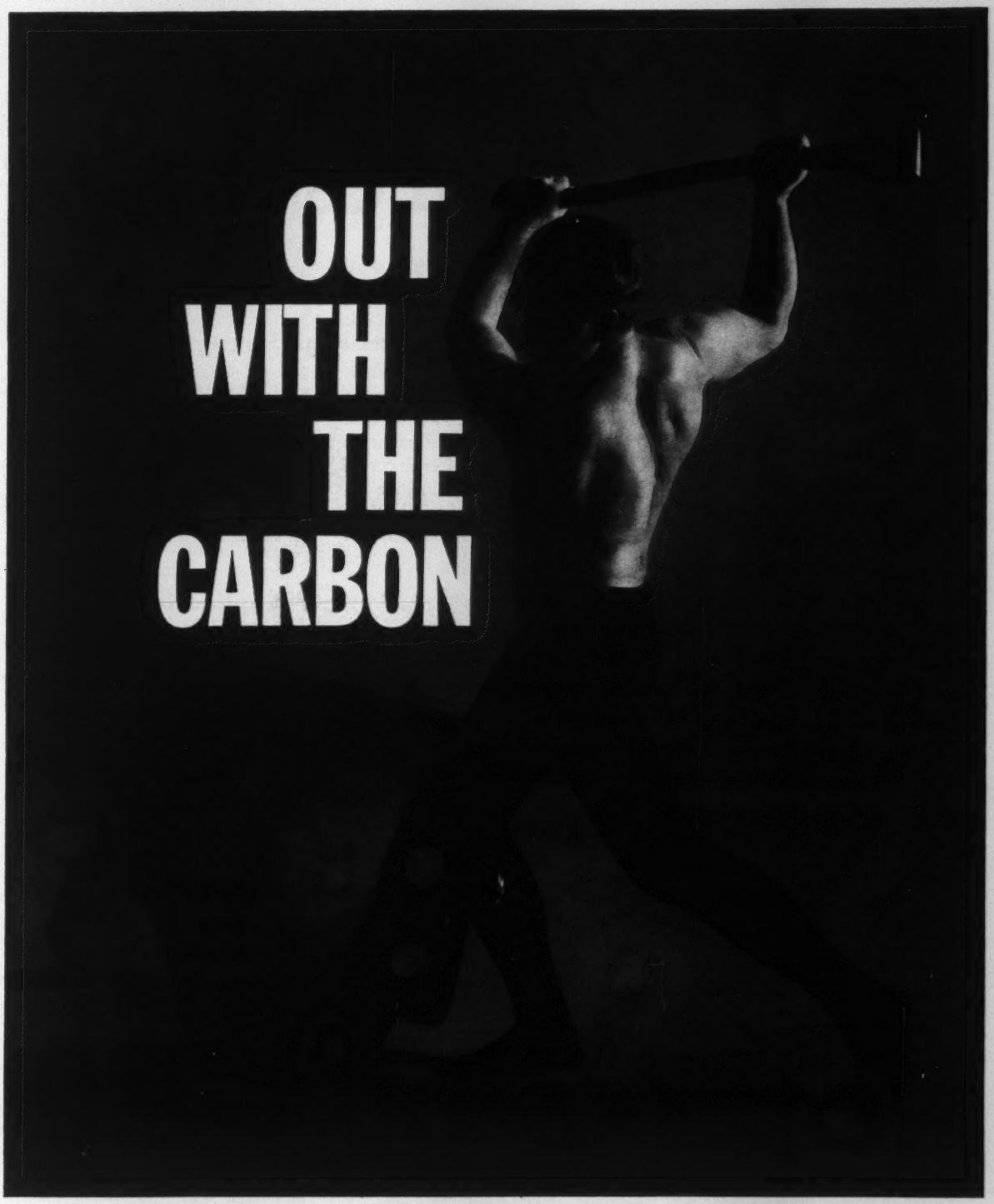

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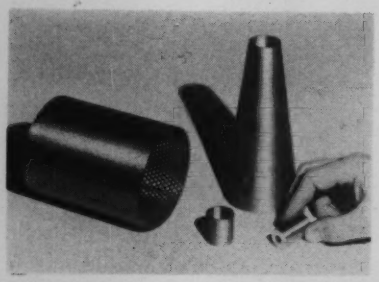
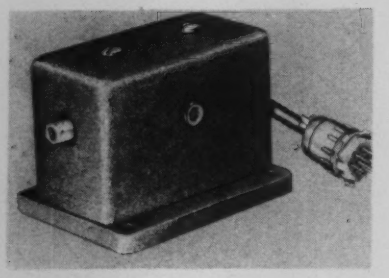
New Materials and Components



Porous Metal Features High Strength

Produced as cylinders, cones, and various geometrical figures of revolution, a line of wound-wire porous metals offers designers in OEM fields a variety of engineering features. These features include accurate pore-size control with ratings of 10 and 20 microns nominal, and 25 and 50 microns absolute. Made by winding stranded and solid wires, side by side and layer on layer, the porous metal has a temperature rating according to the wire material used; adapts to many processes. (Bendix Filter Div.)

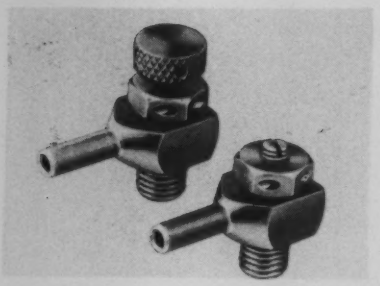
For more data circle No. 25 on postcard, p. 121



Transducer Detects Remote Applications

Designed for the detection of static or dynamic mechanical displacement, a position-sensitive transducer incorporates a linear variable differential transformer as its basic sensing element. The highly-accurate device features high stepless output, external zero adjustment, and infinite resolution. The unit weighs 12 oz and is less than 12 cu in., in volume. The device operates over a temperature range from —65° to +220°F, with special units for operation in environments up to +500°F. (Schaevitz Engineering)

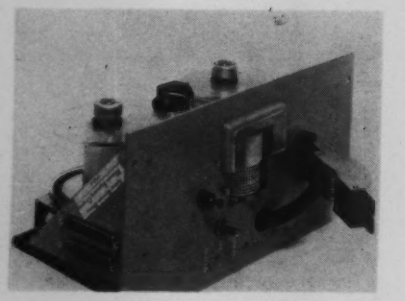
For more data circle No. 26 on postcard, p. 121



Bleeder Valves Allow Visual Check

Stainless-steel bleeder valves permit visual check of bleeding or purging of hydraulic lines while the pump or system is in operation. The line of valves features a 360° rotatable discharge port for directional control of flow. Used with any high-pressure hydraulic system, they eliminate fire hazards and afford maximum safety for operating personnel. The valves have a burst pressure above 14,000 psi, and a temperature range from —65° to +275°F. Safety wire holes are provided. (Fluid Regulators Inc.)

For more data circle No. 27 on postcard, p. 121



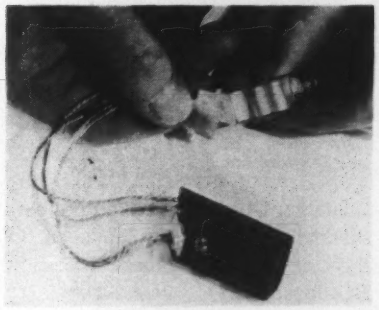
Programmer Stores up to 250 Ft of Tape

A bi-directional, punched-taped programmer finds use in automatic test equipment and digital data processing systems. It provides great advantages over conventional rotary-switching equipment. The unit can be the keystone for design of automatic process-control equipment with random or sequential access to 3000 discrete tests. The unit uses 2-in. wide tape, with 1 in. for punched information and 1 in. for printed information to allow visual selection of any 1-in. frame. The panel of the unit measures 6 x 11¾ in. with 5¾ in. below the panel. (Electronic Engineering Co. of Calif.)

For more data circle No. 28 on postcard, p. 121

Terminal Brushes

Quick-disconnect terminal brushes facilitate brush replacement on electric utility equipment, and on motors or generators in which the brushes are difficult to reach. The assembly consists of a station-



ary clip easily bolted to the machine, into which either one or two terminals can be snapped. All parts are silver-plated beryllium copper for minimum resistance. (National Carbon Co., Div. of Union Carbide Corp.)

For more data circle No. 29 on postcard, p. 121

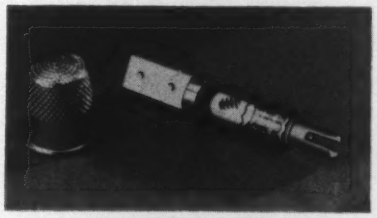
Furnace Walls

Curved furnace-block units can form monolithic walls of circular furnaces without using wooden forms. The units are hollow refractory units which are placed in position, and then filled with special pour-type refractory. When the fill has set, a unified monolithic structure exists. There are no joints. (Refractory & Insulation Corp.)

For more data circle No. 30 on postcard, p. 121

Time-Delay Springs

Liquid compressibility makes a miniature spring useful as a time-delay relay for an electronic circuit. The body of the spring is only 1-in.



long by ⅜-in. diam. These dimensions don't include mounting ends. These units provide fast compressive spring action. Time-delay extension is from a built-in dash pot. Adjustments can be made to obtain up to 42 minutes delay for travel of 1/16 in. of the return stroke; then release for rapid travel of the last 3/16 in. of the stroke to actuate other circuity. Spring force is 8-lb endload and 6-lb preload. (Taylor Devices Inc.)

For more data circle No. 31 on postcard, p. 121

Dry-Type Transformer

Reduced in size and weight, a new transformer has noise levels below NEMA requirements. Single and 3-phase units have ratings through 15 kva and 600 v. They are designed with core and coil assemblies in steel weatherproof cases completely filled with a new com-

pound filling. Use of the filling results in rapid transfer of heat and quiet operation. Wound-core construction of a silicon alloy steel results in lower losses, and better regulation. Terminal compartment with knockouts in sides and bottom is provided. (Standard Transformer Co.)

For more data circle No. 32 on postcard, p. 121

Removable Filter

Designed to withstand pressures up to 10,000 psi, a new filter is reported to offer a larger filter surface area per unit volume than any other type of filtration. Filtration is available as low as 2 microns nominal. Design allows removal and cleaning of the element while keeping pipe lines uncontaminated. A single clamp closure permits removal of the body tube, cleaning and reinstallation in minutes. The filter is available in several pipe sizes. It contains a porous-metal

"the HITCHINER way..."

allows flexibility in design with INVESTMENT CASTING

This part is a carrier for a stripper on a citrus peeling machine. It is typical of thousands of irregularly shaped components that are designed with only a particular function in mind and no compromise with production limitations. This type of metal part often requires several changes before the design is finalized.

A late design change in this part, cast in 303 stainless steel, incorporated a 45° bevel, top and bottom on both sides of the serrated pad section. The tooling was altered at very little cost while the cost of the finished casting was not increased at all. The relatively low cost of tooling and tooling changes make the investment casting process an economical and flexible method.

Flexibility in design, a wide freedom of choice in alloy and the elimination of expensive machining operations made possible with the investment casting process may help you solve your parts problems. Send us your sample or blueprint and find out with a Hitchiner "engineered quotation" — no obligation.

Find out how our new ceramic shell technique can possibly benefit you. Send for our free, new revised brochure on the latest investment casting methods.

HITCHINER
MANUFACTURING COMPANY INC.
MILFORD 20, NEW HAMPSHIRE

Coast to Coast Engineering Representatives

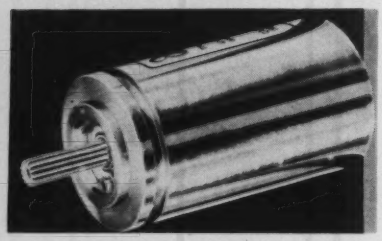
element which can be used with or without a filter aid. Elements can be supplied as cylinders, bayonets, stars or in special types such as

corrugated, sintered woven-wire mesh. Materials available include stainless steel (standard) or monel, nickel, inconel and others. (Micro Metallic Div., Pall Corp.)

For more data circle No. 33 on postcard, p. 121

Servo Motors

Designed for small-space applications, a short-size servo motor measures only 0.863-in. long and weighs 1.2 oz. Its temperature range is —55° to +125°C. Stall torque is 0.2 oz-in. No-load speed

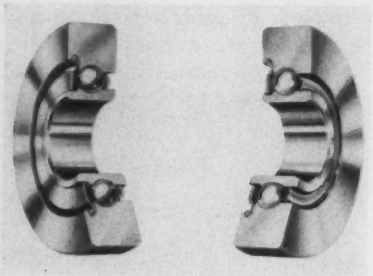


equals 6200 rpm at rated voltages of 26 v fixed phase and 40 v control phase. (John Oster Mfg. Co.)

For more data circle No. 34 on postcard, p. 121

Instrument Bearings

A series of thin-width precision instrument bearings are designed for use in synchros, gear trains, potentiometers, servos and small motors. The new bearings feature a high outside-diameter to width ratio. This allows designers to use economical through-bored and through-ground housings. More efficient production and improved bearing alignment are the result. Narrow width of the bearings saves space. Nine sizes with OD ranges from 0.275 to 0.5 in. and bores from 0.0937 to 0.1875 in. are



available. Open, single- and double-shielded bearings are included in the series. (Miniature Precision Bearings, Inc.)

For more data circle No. 35 on postcard, p. 121

Delrin Lock Nuts

Open-end acorn lock nuts made of Delrin are suitable for lawn furniture, toys, hotel luggage racks, aluminum-tubing products and similar light-duty uses where corrosion resistance and reusable locking action are desirable. These nuts have good strength, rigidity, dimen-

EXECUTIVE REPORT #15

THIS WHEEL PLAYS 9 ROLES

To Cut Costs for Steel Producers

In the production or fabrication of steel, the Wheelabrator airless abrasive blast wheel is playing 9 or more starring roles. It excels as a cost- and time-saver in descaling strip, sheets, plate, bar stock, skelp, structural shapes, wire rod, slabs and billets, at mill roll etching, ingot mold conditioning, and other specialized applications.

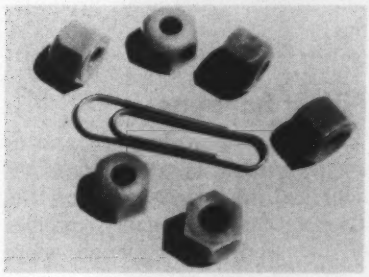
Wheelabrator mechanical descaling of steel reduces the cost of acid pickling, reduces man-hours of work, requires less floor space than pickling equipment, substantially lowers cleaning costs and enables straight-line automated production. And it results in a superior surface for cold rolling, cold forming, cold and deep drawing, and for adherence of all types of metal finishes.

Over 100 Applications prove Wheelabrator Cost Savings

Wide use throughout the steel industry has proved the Wheelabrator process. For engineering consultation on your problem, write Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, P. O. Box 490, Scarborough, Ont.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

sional stability and resistance to water and organics. Non-toxic and odorless, they're light in weight and smooth to the touch. The nuts have a holding strength of 500-600 lb under straight tension for the #10



size. The ¼-in. size withstands 600-700 lb straight tension. Colors available include: metallic gray, metallic gold and natural off-white. (Russell, Burdsall & Ward Bolt and Nut Co.)

For more data circle No. 36 on postcard, p. 121

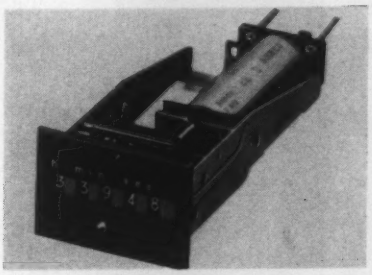
Anti-Sieze Compound

A high-temperature, anti-sieze thread compound lubricates bolts, studs, flanges, etc. at high pressures and at temperatures up to 1800°F. The compound increases lubricating and sealing qualities; lowers breaking and running torque; is non-settling and non-hardening; and remains homogenized. It can also be used in below-freezing weather. In addition, the compound prevents rust and corrosion and stops galling and siezing of threaded surfaces. (Felt Products Co.)

For more data circle No. 37 on postcard, p. 121

Timers

Available in four- or five-digit models, compact electromechanical timers indicate hours, minutes and



seconds. They indicate time when pulsed each minute, second, 1/5 or 1/10 second by a suitable impulse transmitter. The timers have instantaneous mechanical toggle-type zero resets. They're also available with remote electrical resets. Being compact, these timers are suitable for flush panel mounting. (Landis & Gyr, Inc.)

For more data circle No. 38 on postcard, p. 121

Control Transformers

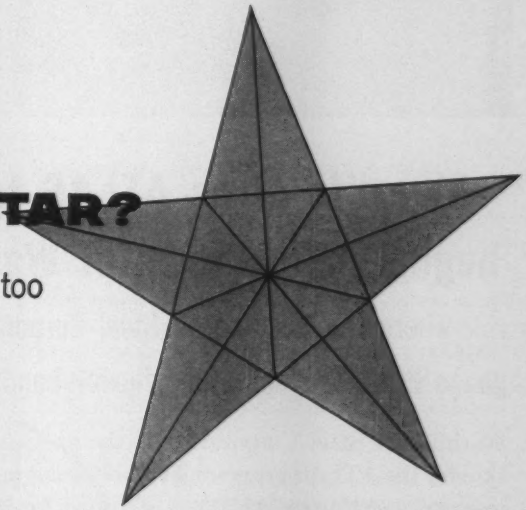
Sealed in polyethylene bags, control transformers are individually packed in corrugated cartons. They are supplied with screw-type termi-

nals, constructed of heavy nickel-plated brass, to which is riveted a section of rag paper. Both core and coil are varnish dipped and baked

EXECUTIVE REPORT #16

HOW MANY TRIANGLES* CAN YOU FIND IN THIS STAR?

Look for the hidden value in blast cleaning abrasives, too



The "hidden values" you get in a high quality steel abrasive, like Wheelabrator Steel Shot, far outweigh any price advantage of the so-called "economy" abrasives. Wheelabrator Steel Shot is harder and tougher — lives for many more cycles through your blast equipment. It cleans better — allows shorter blast cycles. You'll get better, faster cleaning, lower maintenance, lower actual cleaning costs with top quality Wheelabrator Steel Shot. Thousands of users do. Your Wheelabrator Abrasive Engineer will prove it.

Write today for this new handbook of blast cleaning abrasive performance, full of charts and facts to help you control abrasive consumption and reduce cleaning costs. Write to Wheelabrator Corp., 510 S. Byrkit St., Mishawaka, Ind. In Canada, Wheelabrator Corp., Canadian Div., P. O. Box 490, Scarborough, Ontario.

WHEELABRATOR
AIRLESS BLAST EQUIPMENT

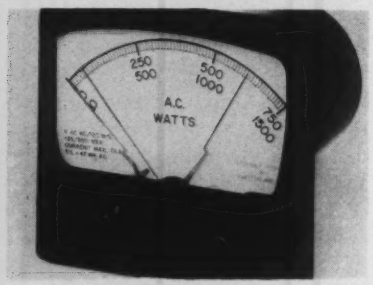
If you examine it closely enough, you'll find 97 triangles.

for complete protection. Connecting links are supplied for series or parallel connections on primary. (Hindle Transformer Co.)

For more data circle No. 39 on postcard, p. 121

Wattmeter

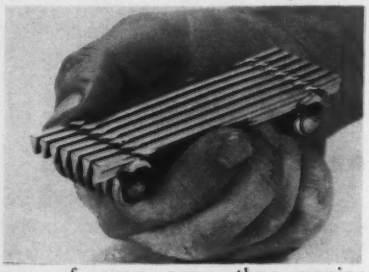
An ac-dc contact-making wattmeter is capable of both indicating and controlling power in the lower milliwatt range. Primarily for measuring power, it is available in modified form as a true rms voltmeter or ammeter, or as a varmeter. The instrument can monitor the product of as many as four different variables. Greatest full-scale sensitivity at present is 500 milliwatts, either ac or dc. The instrument can be built to operate on any ac frequency up to 1000 cycles per second. (Assembly Products, Inc.)



For more data circle No. 40 on postcard, p. 121

Filter Screens

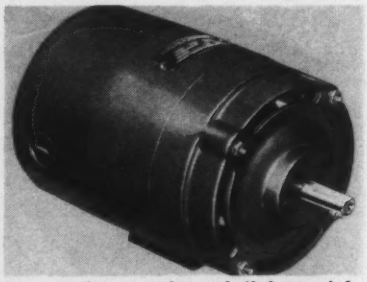
Self-cleaning wedge-wire screens are reported to pass more tons per hour and last longer than previous filter screens. High, narrow profiles of the wedge wire permit more wires per area of working screen surface than other shaped-wire screens. This increases the percentage of open area; thus upping screening capacity. Uses include: sifting, screening, dewatering, sizing, washing and filtering of minerals, chemical products, papermaking materials and food products. (National-Standard Co.)

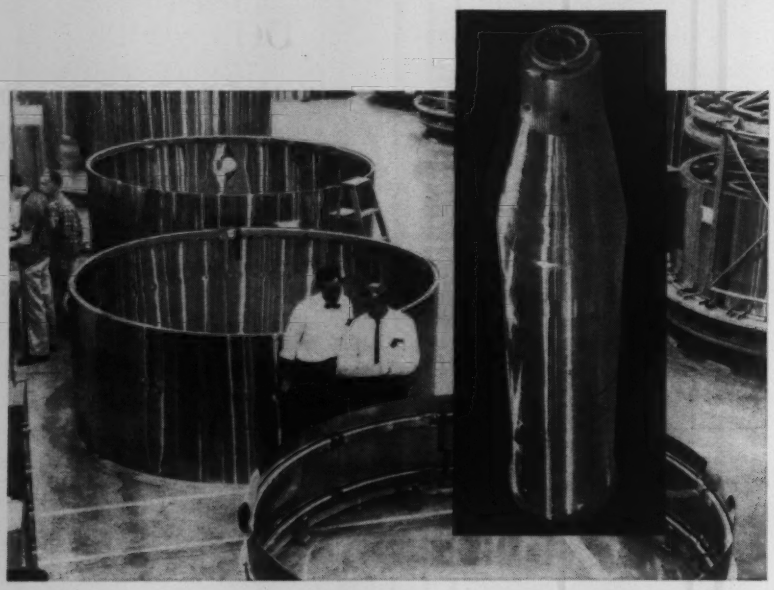


For more data circle No. 41 on postcard, p. 121

Series-Wound Motors

Three new motors, completing a line of 17 standard universals in the 1 to 1/50 hp range, have high operating speed and starting torque. The motors also feature adaptability to speed control, and light weight per hp. They have open continuous ratings as follows: ½ hp at 5000 rpm, ¾ hp at 7500 rpm, and 1 hp at 10,000 rpm. Built in aluminum housings, they operate on 115 v





"the life of an ATLAS tank section begins in the town of Washington, Pa.

. . . where the Washington Steel Corporation produces thin-gauge Stainless Steel in long, flexible bands about a yard wide."*

Washington Steel Corporation is the exclusive supplier of stainless skin for the ATLAS program for a very good reason: it has been able to meet the exacting specifications laid down for this specific undertaking.

Washington Steel Corporation is the pioneer in precision-rolling of light gauge stainless sheets by the Sendzimir process.

*ATLAS—The Story of a Missile
by John L. Chapman, ©1960

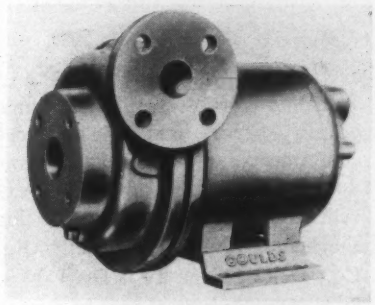
WASHINGTON STEEL CORPORATION
3-L WOODLAND AVENUE WASHINGTON, PA.

dc to 60 cycles ac, and are non-reversible, rotating counter-clockwise at the commutator end. Many mechanical and electrical modifications are possible. All three have pad-type bases, net weight of 13 lb, length of 8⅞ in., width of 5¾ in., and height of about 5½ in. (Universal Motor Div., Robbins & Myers, Inc.)

For more data circle No. 42 on postcard, p. 121

Centrifugal Pumps

Seal-less "canned" pumps provide leak-proof handling of volatile, toxic, inflammable or other hazardous liquids. These pumps have no mechanical seal, stuffing box or gland. These features are the result of combining the motor and pump as an integral unit. Built in two sizes, the pumps have a capacity up



to 110 gpm, heads up to 100 ft; and are recommended for handling clear liquids only. Cooling of the motor and lubrication of moving parts is accomplished by circulating a controlled portion of the liquid being handled through the sealed rotor housing and the grooved bearings. (Goulds Pumps, Inc.)

For more data circle No. 43 on postcard, p. 121

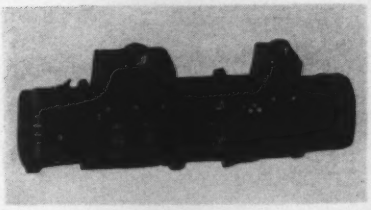
Brazing Alloy

A nickel - base, stainless - type, brazing alloy is designed for high-temperature service. It's a boron-free material which has low diffusion properties. This makes it ideal for heat-exchanger core applications. (Stainless Processing Div., Wall Colmonoy Corp.)

For more data circle No. 44 on postcard, p. 121

Power Equipment

A special unit, for airborne use, has one 400-cycle motor which drives two dc generators. This provides a complete regulated dc power



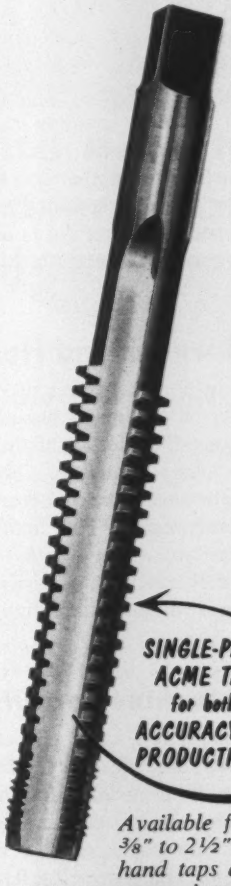
supply for a complex navigational computer.

Used for missile ground systems, aircraft ground supplies, and low-cost, high-reliability computer and automation power supplies, a line of standard ac-dc precise-power sets provide power ranging from 3-25 kw. The voltage ratings are from 11-260 v. Two, three or more dc generators may be coupled to the same motor, thus yielding compact multiple output sets. (Electric Speciality Co.)

For more data circle No. 45 on postcard, p. 121

Ernie's the wonder boy since he's using our

ACME TAPS!



Ernie's job with a large Cincinnati firm was like any other young machinist's—until we surprised his boss by delivering one tap instead of a set of two!

Their order: A set of rough and finish Acme taps to produce a 2⅛" diameter, 4 pitch, double left hand thread in a part made of Johnson bronze. Length of thread 7", with a close concentricity between thread and major part.

Our long experience in producing Acme taps suggested that this job *might* be done with a *single-pass* tap. We experimented—and came up with a tap that amazed the whole shop.

Now, instead of the skilled mechanic needed for multiple stage taps, less experienced fellows like Ernie are producing the same parts in half the time. Better quality, too. And no broken finishing taps or loss of other parts.

With production costs down and high-priced personnel released for more productive assignments, this company now stands in a better competitive position.

We've been in this business for over 20 years and will be glad to help you, too. Send for our brochure.

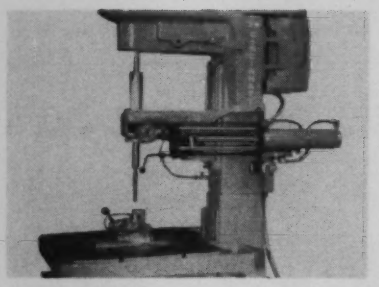
SINGLE-PASS ACME TAP for both ACCURACY & PRODUCTION

- SHOP-TESTED (12 years)
- CUSTOMER ACCEPTED (4 years)
- FIRST CHOICE OF LEADING LATHE, VALVE AND MACHINE TOOL MANUFACTURERS

Available from factory stock! Single-pass Acme Taps from ⅜" to 2½" diameter. Many special pitch, double start and left hand taps also available. Fast delivery on specials. Send us your prints for estimating.

H&R HORSPOOL & ROMINE 5850 Marshall Street Oakland 8, California

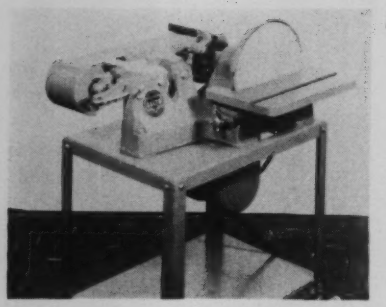
New Equipment and Machinery



Drill-Press Feeds Have Geared Heads

Added to a line of air-powered drill-press feeds are geared-head models. The geared-head transmission units obtain either a greater drill-point thrust, with shorter stroke, or a longer stroke at reduced thrust. The geared power-transmission arm does not protrude beyond the spindle to interfere with the operator. Drill-point stroke and thrust can range from 8-in. stroke at 625-lb maximum thrust, to 2-in. stroke at 2500-lb maximum thrust, on 1¼-in. pinion shaft at 100 psi air pressure. (Beckett-Harcum Co.)

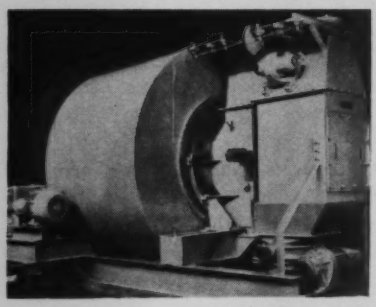
For more data circle No. 46 on postcard, p. 121



Machine Performs 90 Pct of Shop Finishing

Ideal for use in wood- and metal-pattern shops, and all maintenance shops throughout industry, a combination belt and disk finishing machine enables the operator to move from one machine to another quickly. Finishing curved, straight, or irregular-shaped parts requires quick movement. The machine has a standard 4-in. abrasive belt and 12-in. abrasive disk. The unit grinds, surfaces, and polishes steel components, die castings, aluminum, brass, and copper parts excellently. It is also suitable for sharpening tools. (Rockwell Mfg. Co., Delta Power Tool Div.)

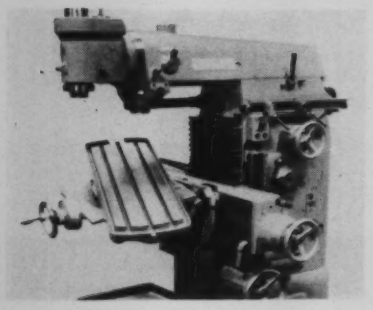
For more data circle No. 47 on postcard, p. 121



Rotary Blender and Hopper Moves Along Track

Forming an almost perfect processing bridge, an automatic blender and hopper blends materials as they come from other processes. The unit then introduces the materials into the next process. The multi-purpose units are dust-tight at all points, and they can fit into existing plants without major adaptations. All controls and movable parts are motor driven or cylinder actuated. A storage chamber supplements blending chamber, keeping secondary ingredients from inter-mixture during blending process. The unit is available in capacities from 500 lb to 20 tons. (Sturtevant Mill Co.)

For more data circle No. 48 on postcard, p. 121

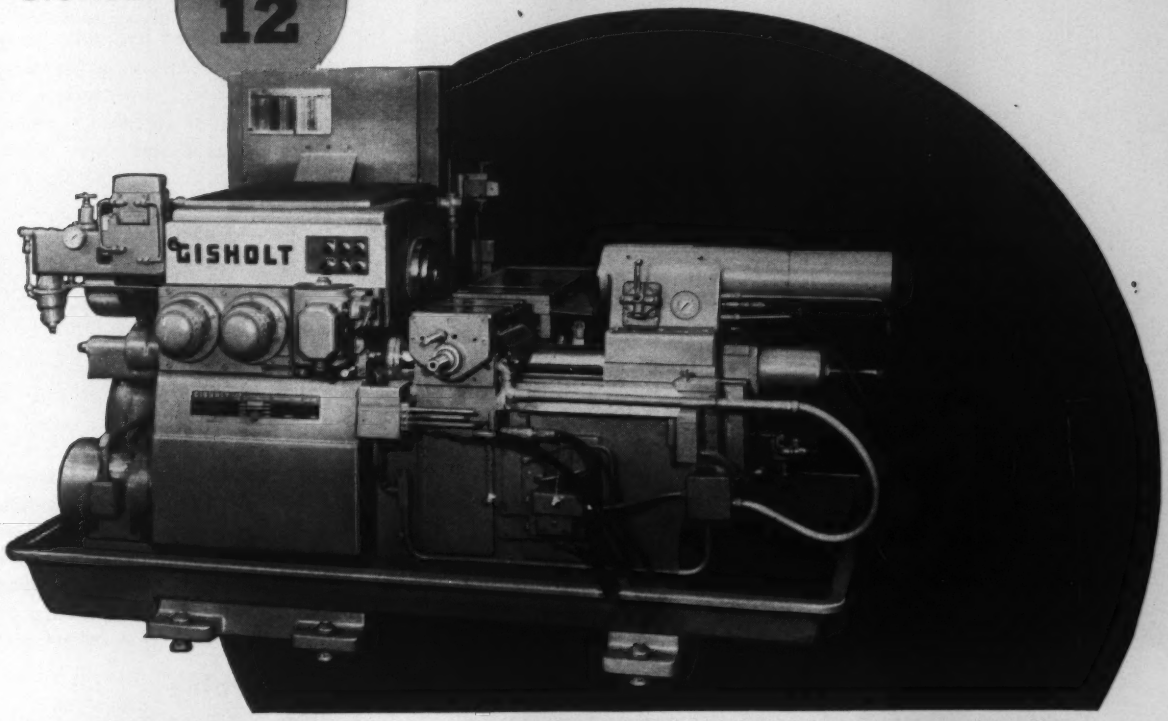


Milling Machine Features High Accuracy

Rigid construction, large capacities, versatility, and accuracy offer a universal milling machine for the toolroom. The workpiece may be arranged at any angle relative to the cutting tool, and vice-versa. The machine has an unusually wide machining range. The throat depth between vertical milling cutter and machine column is 27½ in. Maximum distance between vertical spindle and table surface is 17½ in. Workpieces may be either clamped on the base table, or set on a fixed table or swivelling table, depending on the size of the component. (United Machine Tool Co.)

For more data circle No. 49 on postcard, p. 121

GISHOLT NUMBER 12 AUTOMATIC CHUCKING LATHE



Unequaled in its size range, in versatility, speed and low-cost production

Whether it's for continuous operation in mass production or a wide variety of parts in small lots, this machine is in a class by itself.

Faster automatic cycle. The No. 12 is a fully automatic chucking lathe, capable of performing all types of machining operations in rapid sequence. With 420 spindle speeds ranging from 40 to 2600 r.p.m. and an infinite selection of feeds, it meets every requirement for stock removal, finish and minimum f.t.f. time.

Complete range of accessories. Front, rear, auxiliary and overhead slides can be applied; angular cuts are easily made; JETracer of single- or multiple-pass types can be used. Automation can be incorporated—from simple loading and unloading to gaging and sorting of finished pieces.

Greater power and rigidity. Here, too, is the power (up to 40 h.p.) with rigidity to take full advantage of the newest tooling and the heaviest cuts without vibration.

Boosts operator productivity. It requires a minimum of operator skill and attention—allows him to handle additional machines.

With all its speed and ruggedness, the No. 12 has the extreme flexibility of motions to handle practically any machining job on parts up to 16½" in diameter. It delivers high production with consistent accuracy and less dependence than ever on operator skill.

Ask your Gisholt Representative or write for Bulletin 1213, just off the press.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Machines
• Factory-Rebuilt Machines with New Machine Guarantee

Job Report Courtesy of
Leader Iron Works, Inc., Decatur, Ill.

For peace of mind
on any stainless welding job

This vacuum separator, made of 5/16" Type 316 stainless steel, is designed for 100 psi test pressure. To assure *predictable* results, Arcos Chromend KMo Electrodes (Type 316) were selected for a *combination* of top physical, metallurgical and chemical properties. For maximum benefits in welding stainless—consistent quality, low cost weld metal, and reliability in service —you can count on ARCOS.

WELD WITH ARCOS

STAINLESS ELECTRODES

for quality weld metal

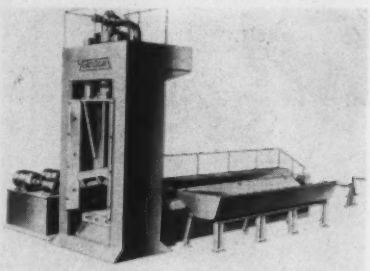
ELECTRODES • WIRE • FLUXES
SEMI-AUTOMATIC AND AUTOMATIC EQUIPMENT FOR WELDING
STAINLESS • LOW ALLOY • ALUMINUM • MILD STEEL

ARCOS CORPORATION • 1500 South 50th St., Philadelphia 43, Pa.

NEW EQUIPMENT

Scrap Shear

A conveyor-feed hydraulic scrap shear has an extra-large capacity due to open-end construction of the charging box. Steel-mill rejects or bulky railroad and heavy indus-

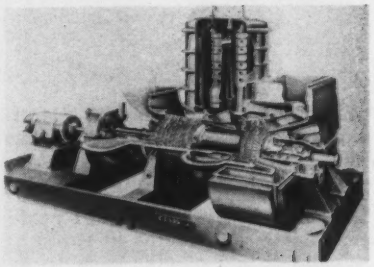


trial scrap of any length can be handled without prior torching. The continuous conveyor system permits operation without interruption —cutting to lengths of 6 in. to 5 ft or more. (M. S. Kaplan Co.)

For more data circle No. 50 on postcard, p. 121

Gas Turbine

With a NEMA rating of 9000 bhp, an open-cycle, single-shaft gas turbine achieves substantial savings in initial equipment cost, transportation, floor space, foundations, and installation expense. It burns either



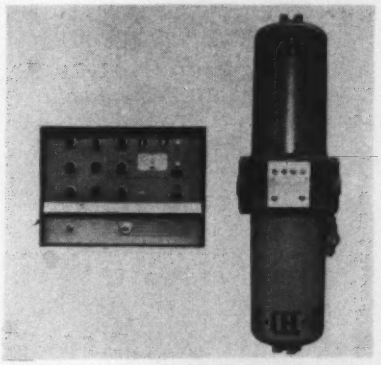
liquid or gaseous fuels, and is capable of continuous operation under full-load conditions at normal-rated speed of 5000 rpm. At rated speed, the compressor delivers a mass flow of 135 lb per second. (Clark Bros. Co.)

For more data circle No. 51 on postcard, p. 121

Process Separator

Featuring faster analysis and automatic programming of up to eight streams, a chromatograph makes analyses of liquids, gases, or vapors in 1/20 to 1/50 the time

required by conventional chromatographs, depending upon the product. Two separate units comprise the chromatograph — an analyzer

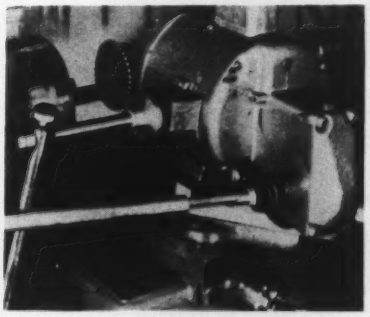


unit and a control unit. Simplified modular construction allows users to buy the features they need. (Consolidated Electrodynamics Corp.)

For more data circle No. 52 on postcard, p. 121

Thread-Milling Setup

Designed to fit any lathe, a new thread-miller can be set-up for production runs within five minutes. The cutter, which can be resharpened by conventional methods, locks into position. With the proper screw feed set, the unit's

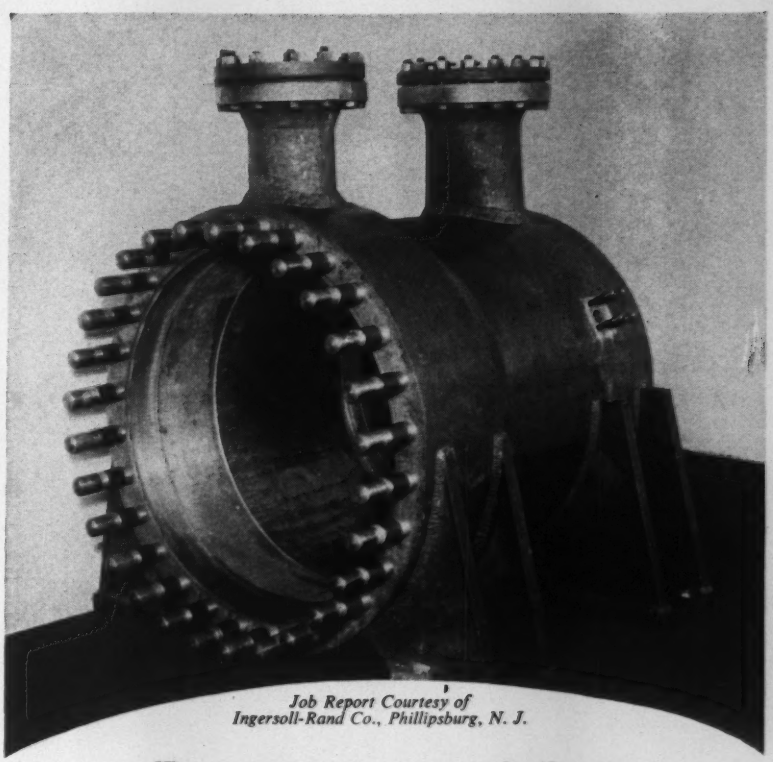


ready for production-line operation. One pass is sufficient for all types of materials. Cutters range from ½ to 9 in. for internal threading, and from 1/32 to 9 in. for external threading. The unit cuts from 4 to 200 threads per inch. (The Fen-Thread-Machine Co., Inc.)

For more data circle No. 53 on postcard, p. 121

Pocket Driver Tool

A new four-way pocket tool fits a variety of nuts, bolts and screws. The unit's plastic handle features a ¼-in. socket at one end with a



Job Report Courtesy of Ingersoll-Rand Co., Phillipsburg, N. J.

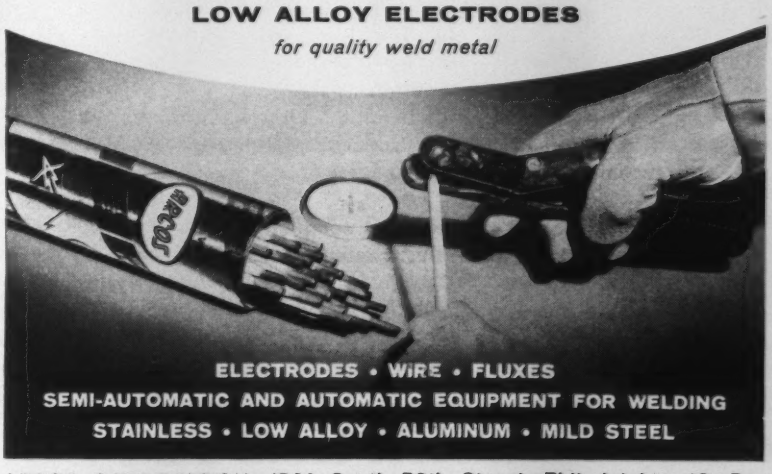
For pressure resisting high strength low alloy welds

The intake and discharge nozzle welds on this re-cycle compressor casing must provide high strength for long service life under rugged conditions. To assure sound, crack-free welds, Arcos Tensilend 70 Electrodes were used. These electrodes, especially suited for welding mild steel and low-alloy high-tensile steels, produce welds with a yield of 70,000 psi in the *as welded* condition. Use Arcos electrodes for the same dependable performance.

WELD WITH ARCOS

LOW ALLOY ELECTRODES

for quality weld metal



ELECTRODES • WIRE • FLUXES

SEMI-AUTOMATIC AND AUTOMATIC EQUIPMENT FOR WELDING

STAINLESS • LOW ALLOY • ALUMINUM • MILD STEEL

ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

Jomac gloves stand up under treatment that even expensive leather gloves couldn't take!

The test shown above, in which a razor blade is drawn sharply across a Jomac glove without ill effect, shows the remarkable cut resistance of Jomac's loop-pile fabric . . . *protection that even leather doesn't afford.*

Moreover, Jomac gloves *wear longer* than leather gloves and provide a *better grip* on oily surfaces. And most Jomacs—like the HR gloves shown above—are reversible . . . so any two make a pair, any pair gives you four working surfaces.

Write today for free literature. Describe working conditions and materials handled: we'll make specific recommendations.

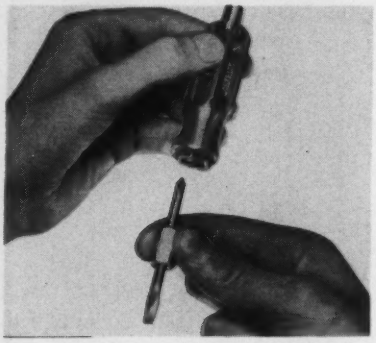
Jomac also makes a complete line of North PVC-coated gloves

JOMAC
INDUSTRIAL GLOVES

JOMAC INC., DEPT. K, PHILADELPHIA 38, PA.

NEW EQUIPMENT

7/16-in. socket at the opposite end for driving hex nuts, bolts and screws. The double-end blade inserts in the 7/16-in. socket to con-

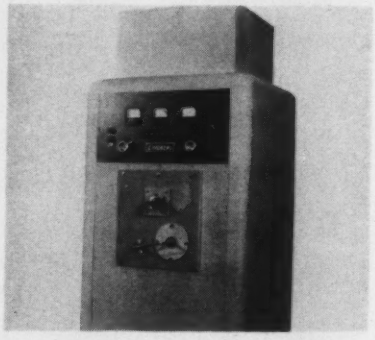


vert the tool to either a 3/16-in. slotted or a No. 1 Phillips screwdriver. (Xcelite, Inc.)

For more data circle No. 54 on postcard, p. 121

Induction-Heating Unit

Designed specially for research and development work and for production of semiconductor and other conductive materials, a new dual - frequency induction - heating unit operates at about 400 kc and



4 mc. With 10-kw output, the high-frequency unit has a totally-enclosed cabinet. Outside dimensions of cabinet are 40-in. wide by 40-in. deep by 76-in. high. Net weight is about 2150 lb. (Lindberg Engineering Co.)

For more data circle No. 55 on postcard, p. 121

Plug-In Press Feeder

A new standard, packaged plug-in feeder unit automates open-back inclinable presses. It promotes safety and increases production of small stampings. The unit can feed parts into dies at rates from 40 to

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TWO MAN TEAM

Users of Ansco X-ray films know that it's like having an extra man on every weld whenever Ansco is on the job. That's because Ansco films provide a certainty that often means dramatic savings in quick, easy flaw detection.

Superb gradation and subtle tonal separation are characteristics of all Ansco X-ray films. That's because Ansco X-ray films are critically coated to tolerances that provide unequalled quality and uniformity year in and year out.

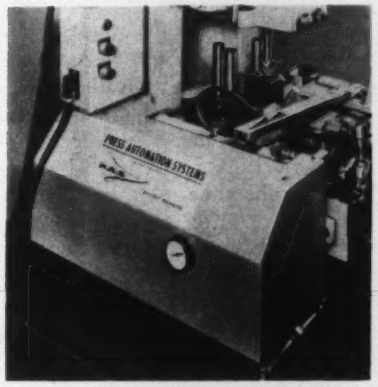
Try *ANSCO SUPERAY 'A'* whenever fast, fine grain, high-speed results are needed. *ANSCO SUPERAY 'B'* is the natural choice for extreme contrast and ultra-fine grain. *ANSCO SUPERAY 'C'* is a very high speed film for gamma radiography.

Try these films soon . . . you'll have another man on the job. Ansco, Binghamton, N. Y., A Division of General Aniline & Film Corporation.

Ansco

Industrial X-ray

60 pieces per minute. Mounting on the side of a press, it transfers parts to the die from an operator-fed, preload station located out of the



die area. The parts are removed from the die by air ejection or other type of automatic unloading means. (Press Automation Systems, Inc.)

For more data circle No. 56 on postcard, p. 121

Baling Press

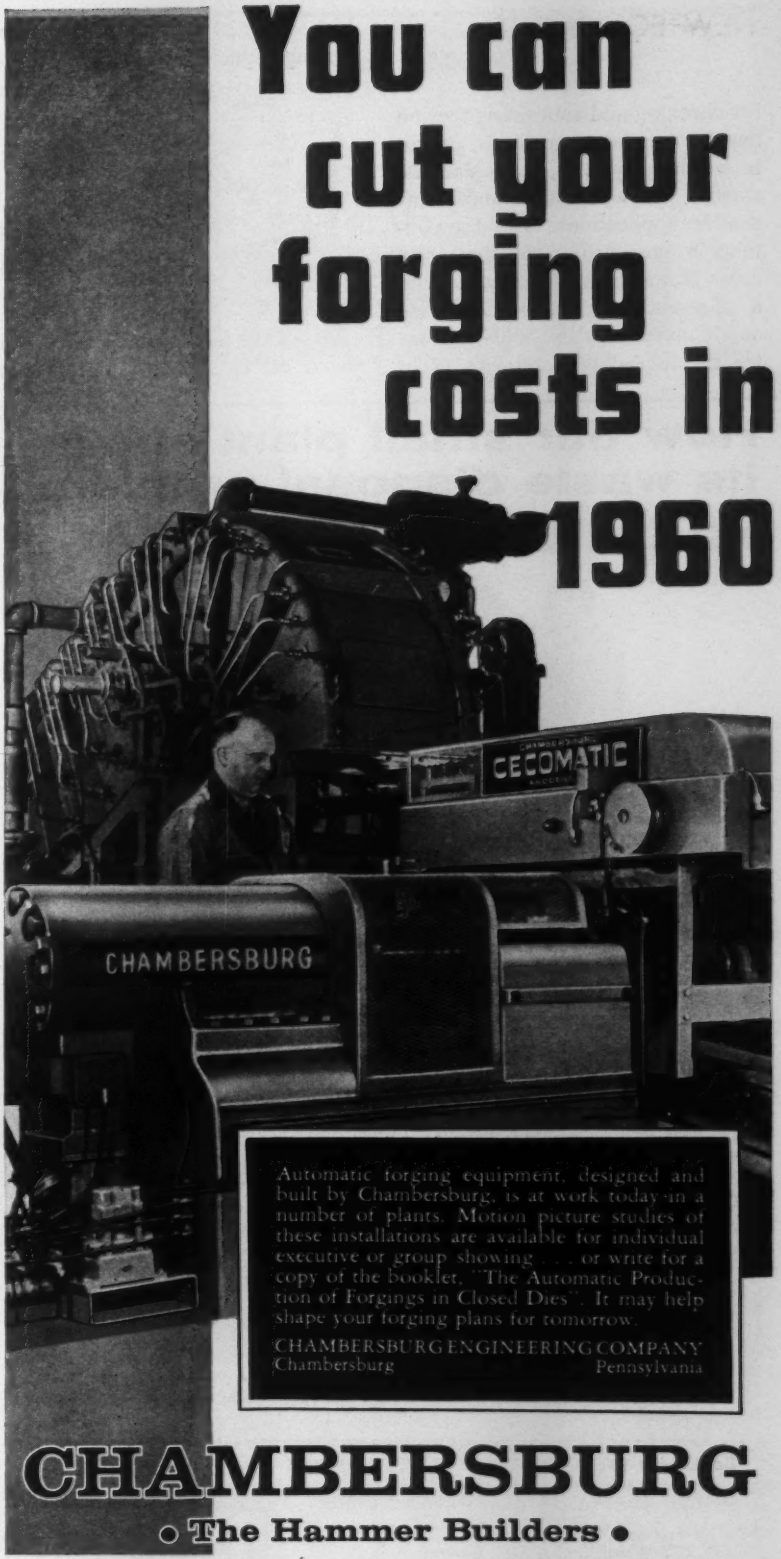
A new metal-baling press compresses entire passenger body and frame into bale about 24 x 24 x 60 in. The hopper of the hydraulic unit is 693 cu ft, big enough to hold the largest automobile without cutting or shearing. The first ram

applies 804,000 lb to compress the load into a small area in front of the hopper. The second ram compresses the scrap with 1,257,000 lb from the side. Baling cycle takes about 1½ minutes with automatic ejection. (The Wheland Co.)

For more data circle No. 57 on postcard, p. 121

Calibration Kit

Designed to perform with laboratory precision and a high degree of dependability, even in field use, a portable, lightweight, calibration kit provides a convenient versatile unit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Automatic forging equipment, designed and built by Chambersburg, is at work today in a number of plants. Motion picture studies of these installations are available for individual executive or group showing . . . or write for a copy of the booklet, "The Automatic Production of Forgings in Closed Dies". It may help shape your forging plans for tomorrow.
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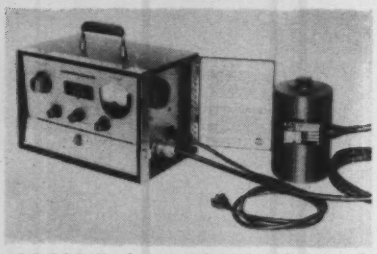
DESIGNERS AND MANUFACTURERS OF THE IMPACTER
When it's a vital part, design it to be FORGED

for checking and calibrating tension and/or compression loads output in weighing systems, jet-engine test stands, missile-thrust stands, and similar applications. The kit contains a precision calibration indicator featuring digital readout and a high-accuracy calibration load cell. Combined, these units guarantee direct-reading accuracies of as high as 1/20 pct of reading. Operating capacities range from 60 to



120,000 lb for tension service, and from 60 to 240,000 lb for compression service. (Baldwin-Lima-Hamilton Corp.)

For more data circle No. 58 on postcard, p. 121

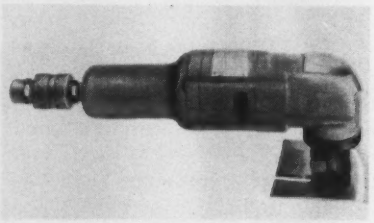
Safety Shoes

Longer wear and increased comfort are promised the wearers of a new line of safety shoes. A special treatment results in leather that's flexible at low temperatures and extremely porous. The porosity allows the leather to "breathe"; thus making the shoe more comfortable on the foot. (Iron Age Safety Shoes)

For more data circle No. 59 on postcard, p. 121

Pneumatic Nibbler

A compact pneumatic nibbler cuts sheet metal up to 13-gage stainless steel, without distorting or curling. This lightweight, air-

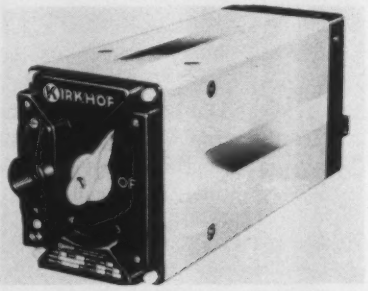


powered nibbler is designed for safety and efficiency in cutting heavier metal than other nibblers of comparable size and weight. (Modern Mfg. Co., Inc.)

For more data circle No. 60 on postcard, p. 121

Welding Transformers

Epoxy-insulated welding transformers have ratings of 60, 70, 90, and 130 kva. Based on the previous standard temperature rise of 85°C, the thermal capacities of the four



models are 50, 60, 70, and 100 kva respectively. The epoxy insulation of the units makes a 110°C rise completely safe and practical for high-production welding. Related benefits include: longer op-

How our small plant solved its waste disposal problem WITHOUT CAPITAL OUTLAY...

Pat. No. 2,900,096

DEMPSTER-DUMPMASTER Equipped Hauler Provides Containers and Service for Small Fee

Our small Midwestern manufacturing firm did not generate enough refuse to justify ownership of its own refuse disposal system. Yet, it was plagued by unsightly trash piles, fire hazards and scattered refuse in the plant yard.

Our plant engineer then heard of a DEMPSTER-DUMPMASTER equipped private hauler in the adjoining city. A survey revealed that two big-capacity refuse containers, placed one at each end of the plant, would handle the entire refuse accumulation.

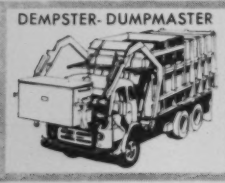
The private hauler placed the containers, and a small monthly fee covered maintenance, labor, hauling and dumping refuse. No capital outlay was involved, disposal costs were reduced, and plant housekeeping was vastly improved.

In all major cities, private haulers who own DEMPSTER-DUMPMASTER equipment render fast, efficient, low-cost refuse storage and collection service. They place one or 100 containers at your service for a reasonable fee. A free brochure describes their service in detail.

Free Brochure and Name of Nearest Private Hauler on Request

Dept. IA-3 DEMPSTER BROTHERS Knoxville 17, Tenn.

DEMPSTER-DUMPMASTER



DEMPSTER-DUMPSTER

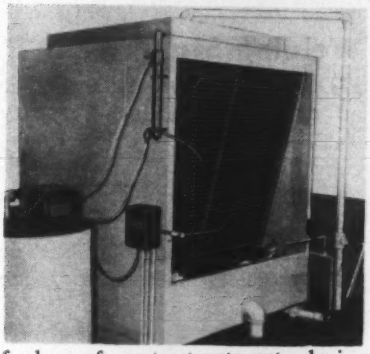
DEMPSTER DUMPMASTER EQUIPPED PRIVATE HAULERS

erating life without maintenance, and built-in protection against intermittent overloads. (Kirkhof Mfg. Corp.)

For more data circle No. 61 on postcard, p. 121

Water Treatment

Designed for use with recirculating cooling-water systems, a new type of water-treatment feeder and controller prevents corrosion, mineral scale, slime and algae. The unit fills the need for a simplified,

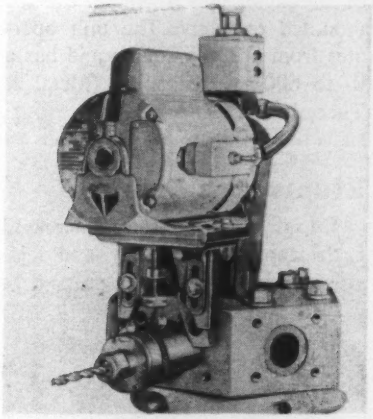


fool-proof water-treatment device to protect refrigeration and air-conditioning systems against improper control or complete lack of water treatment. (Heller Laboratories, Inc.)

For more data circle No. 62 on postcard, p. 121

Drilling Attachment

An attachment for turret lathes broadens the application of the company's deep-hole drilling tools. The attachment makes possible deep-hole drilling with greater



speed and accuracy than ever before. The completely adjustable, self-contained unit fits into any hole on the turret without interfering with other positions. Full-rotating

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New Stock List

1420 South Rockwell Street, Chicago 8, Illinois

NEW: "Big" drilling jobs made easy

This custom "radial drill" is provided by combining standard Delta drill press components—a ball bearing traveling carriage, column, raising mechanism and choice of four Delta 20" drill heads. Mounted on an overhead track, it handles jobs too big for conventional drilling—in production runs too small to justify expensive, special tooling.

Another example of how rugged, versatile, and highly accurate Delta Industrial Tools are being used to replace costly conventional tooling. For illustrated booklet of cost-cutting ideas, write: Rockwell Manufacturing Company, Delta Power Tool Division, 640C N. Lexington Ave., Pittsburgh 8, Pa. In Canada, Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

to get the best joint, use the right

FLUX

you name it—ALL-STATE has it

ALL-STATE makes quality fluxes for torch and soldering iron applications on all commercial metals . . . in the form you prefer: liquid, paste, powder, flux cored solders, flux coated rods. Working temperatures range from 300F to 2200F. Designed for maximum wetting action, minimum fuming. For instance:

DUZALL . . . a new liquid flux for all soft solders, all metals (except light metals). DUZALL eliminates pre-cleaning, increases capillary action, leaves minimum deposit. Comes in handy 4 oz. refillable dispenser-type plastic containers, and in larger units.

#11 BRAZALOY® . . . a paste or powder flux for use on 14 ferrous and bronze alloys. Wide temperature range: 1200F to 2200F. Non-corrosive, non-fuming. Also available extruded on Nickel Silver welding rods.

#31 BRAZALOY® . . . a highly active aluminum brazing flux that gives maximum wetting action, excellent capillary flow. Protects surfaces from discoloration, requires less after-cleaning. An outstanding temperature indicator.

S200 SILVER BRAZING FLUX . . . melts at 600F, becomes transparent at 1100F, protects heated base metal to 1800F. Induces excellent capillary action and flow of silver alloys.

Send for free copy of 54-page Instruction Manual and for information on custom coating your welding rods.

All-State's JET FLUX® and JET FLUX DISPENSER® on production line at Griggs Manufacturing Co. Acetylene and Jet Flux mixed and fed automatically from Dispenser.

VISIT OUR BOOTH 501 AT THE WELDING SHOW

Distributor-Stocked, convenient to buy. Economical to use.

ALL-STATE WELDING ALLOYS CO., INC., White Plains, N. Y.

Call WHite Plains 8-4646 or write for nearest distributor

ARMSTRONG

SET-UP and HOLD-DOWN TOOLS

Whatever its shape, a work piece can be quickly, easily and safely set up on any T-slotted table with ARMSTRONG Set-up Tools. Comprising a complete "system" of supporting and holding devices in all essential sizes, ARMSTRONG Set-up Tools usually pay for themselves on the first job and continue to lower costs for years to come.

Save Time: Keep costly machines and high priced men producing—save time otherwise lost while operators rummage in the scrap box for materials with which to devise makeshift set-up methods.

Prevent Breakage and Spoilage—correctly designed, machined from special steels or drop forged and heat treated, they are extremely stiff, strong and reliable.

Increase Accuracy—hold work rigidly and support it fully regardless of shape.

Prevent Accidents—end risk of set-up failure with resulting tool breakage, damage or personal injury.

Increase Profits—by reducing down time, increasing man hour output, assuring accuracy, ARMSTRONG Set-up and Hold-down Tools cut costs and build profits. They are part of every properly equipped tool room and shop.

Your Local Armstrong Industrial Distributor carries a good stock of Set-up and Hold-down Tools. He offers you quick, efficient service on these, as well as other, quality ARMSTRONG Tools.

ARMSTRONG BROS. TOOL CO.

5203 W. ARMSTRONG AVE. • CHICAGO 46, ILL.

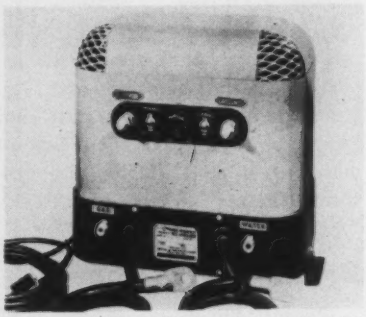
NEW EQUIPMENT

electrical power lead — 360° — avoids entagling lead cord. The drive unit produces concentricity superior to any non-revolving tool. The unit is powered by a ¾-hp motor, 1725 rpm, 110 v, single phase, 60 cycle, or 220 v, 3 phase 60 cycle. A timing belt drive permits variable speeds. (Boyar-Schultz Corp.)

For more data circle No. 63 on postcard, p. 121

Welding Stabilizer

Designed for use with any ac or dc welder, a high-frequency stabilizer, for inert-gas arc welding, converts it for inert-gas shielded-arc welding on aluminum, stainless and alloy steels, copper, magnesium, and dissimilar metals. The unit supplies the necessary arc

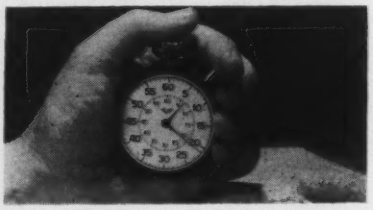


starting and stabilizing current without electrode contact with the work. It controls high frequency, gas flow, water, and post-gas flow by means of a single switch which can be mounted remotely. The unit operates from a 230-v source and has a 0- to 600-amp capacity. (Metal & Thermit Corp.)

For more data circle No. 64 on postcard, p. 121

Stopwatch Design

Design changes have increased both stopwatch capacity and legi-



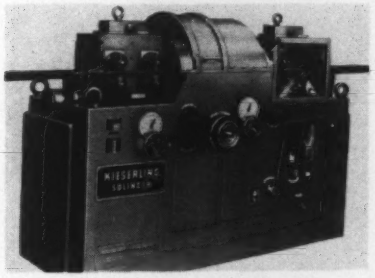
bility. Minutes register on a large red circle around the central shaft, rather than on the conventional

tiny off-center circle with a stub hand. Both the dial and its lettering are 85-100 pct larger than before. There's perfect synchronization of the minute index with sweep-hand revolutions. (Heuer Timer Corp.)

For more data circle No. 65 on postcard, p. 121

Metal-Skin Remover

Developed to reduce manufacturers' rising operating costs, a centerless bar-turning machine removes the skin of a metal. It will turn a black bar into a bright bar of finished size to be used for specific purposes, or for preparing stock for economical machining in

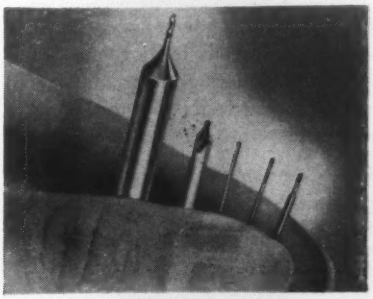


subsequent automatic equipment. The removal of the skin is quite important in preparing the stock for inspection. Carbide-tipped tools are used on these machines at high-speed revolutions. These machines are unlimited in use, and the most difficult metals can be machined. (Straus-Artys Corp.)

For more data circle No. 66 on postcard, p. 121

Miniature Tools

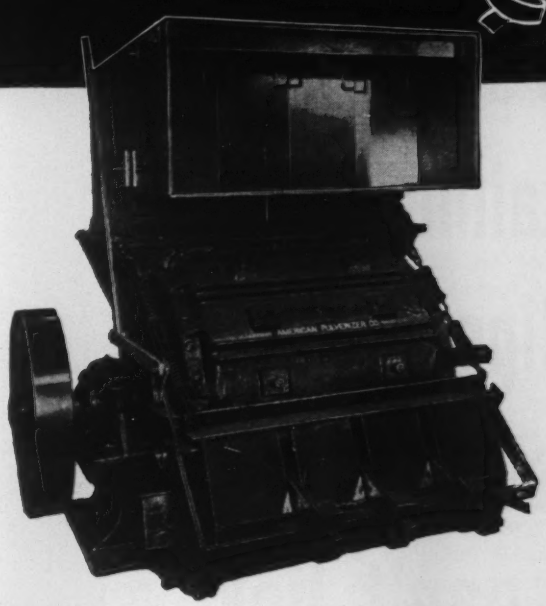
A new line of high-speed steel cutting tools includes miniature twist drills, pivot drills, center drills, reamers and end mills. The



various tools, designed for the growing miniaturized-products industry, come in standard sizes. (The DoALL Co.)

For more data circle No. 67 on postcard, p. 121

Here's A Curly Cue
To New Market Value
For Your Machine Turnings



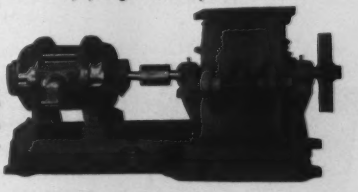
American METAL TURNINGS Crusher

That single machine turning of curled-up steel shown above can be mighty troublesome and costly to your operations.

Gnarled up with thousands of others like itself, it becomes a problem in space . . . gallons of re-usable cutting oil are trapped in the folds . . . and the scrap value is greatly minimized.

Answer? Run this tangled waste through an efficient, AMERICAN METAL TURNINGS CRUSHER. Out come sized ships that are easy to handle for shoveling or pneumatic handling . . . easy to store (savings in space up to 75%) . . . easy to spin for oil recovery . . . and crushed turnings command a higher price.

The cost is easy, too, on your scrap recovery program. Pays for itself.

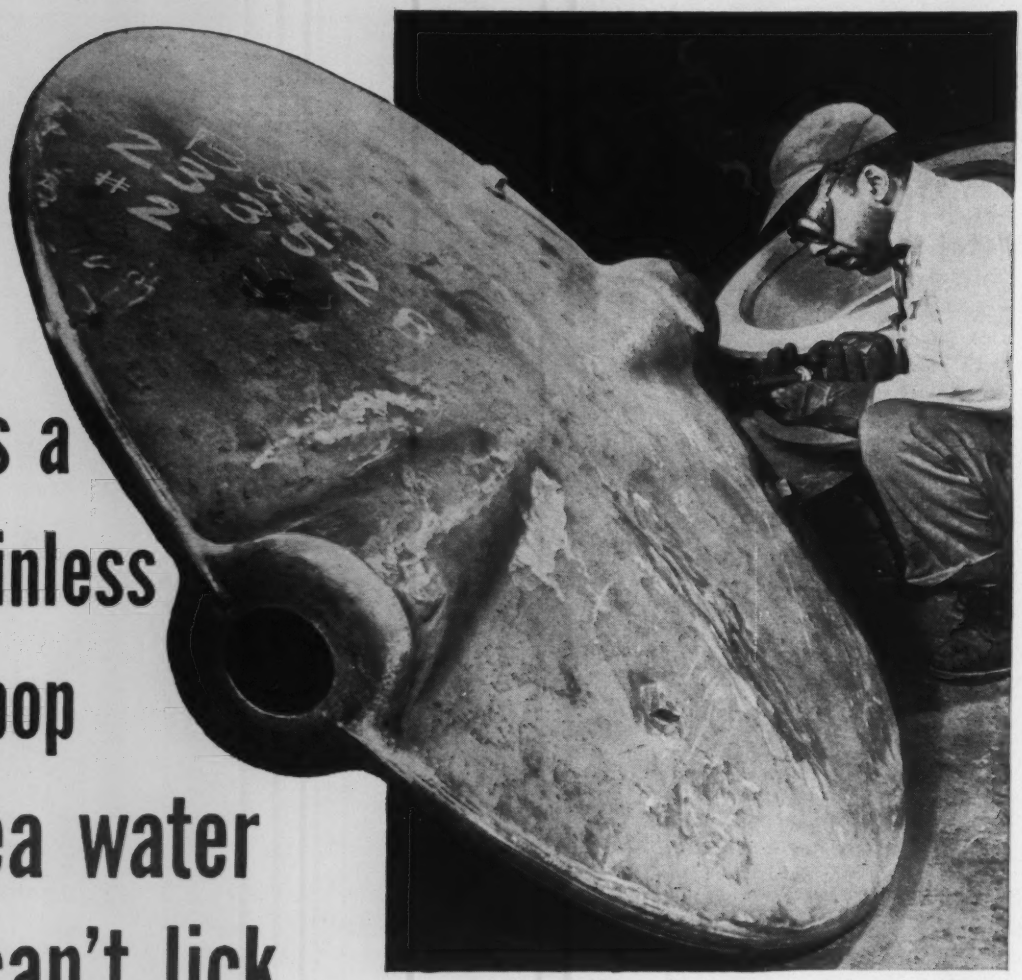


RECLAIM FUSED WELDING FLUX
American Hammermill reduces fused flux to fine regranulation for perfect re-use. Why throw away profits! Details on request.

"Write for Metal Turnings Bulletin"

American PULVERIZER COMPANY
Designers and Manufacturers of Ring Crushers and Pulverizers
1439 MACKLIND AVE. SAINT LOUIS 10, MISSOURI

Here's a stainless lollipop sea water can't lick



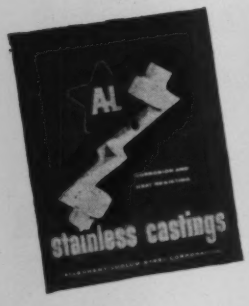
This large (48″ dia., 1701 lbs.) and unusual stainless casting was fabricated by Allegheny Ludlum's Buffalo, N.Y. foundry. It is scheduled for service under the most severe operating conditions, functioning as a wafer valve disc at 25 psi pressure in sea water. Since long life and tight closing are essential in this application, corrosion resistant Type 304 Allegheny Stainless was specified.

Some unusual techniques were employed in the fabrication of this casting. Although the entire valve disc was cast as a single piece, its sides are hollow, with a skin only ¾″ thick. The center shaft was cast solid at the same time the side wings were cored, permitting the single piece, seamless part desired.

If you have a casting problem, or *any* problem that involves corrosion resistance, long life, resistance to wear and abrasion, call the Allegheny Ludlum Sales Office nearest you. An A-L Sales Engineer is ready to put his skills and those of the A-L Technical Staff promptly at your disposal, to serve your requirements from the largest and most complete line of stainless products on the market.

Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.

6663



Write for this 28-page booklet on A-L STAINLESS CASTINGS

28 pages of valuable and complete data on stainless castings: analyses, properties, technical data on handling and heat treatment, typical applications, how to order, etc.

ADDRESS DEPT. A-27

Make it BETTER and LONGER LASTING with

ALLEGHENY STAINLESS

AL

The Iron Age Summary

First Normal Market in Years

Return of normal market conditions means that steel orders will be geared to consumption.

Right now, orders are slow, but April will be a good month in steel shipments.

■ The shakedown period in the steel market is just about completed.

After April tonnage is shipped, the market will settle down to the first normal period in years, with few artificial factors to affect the relationship of steel consumption to orders.

Short-Term Takes Over — This means that the market will react to short-term factors such as seasonal adjustments, auto sales, and other business cycles.

This is in contrast to artificial pressures that have characterized the entire post-war period. These include abnormal buildups and cutbacks of inventory, price and strike hedge buying, and extreme shortages generally resulting from periodic strikes.

After April, What?—April will be a good month for the steel industry in terms of shipments. But unless the rate of new orders picks up, the operating rate is sure to drop off sharply.

The rate of new orders for May and June is disappointing and steel sales offices are putting on all possible pressure to line up sizable orders.

Delaying Tactics—However, the slow rate of incoming business today does not mean the market has collapsed. Many major users are holding off as long as possible before committing themselves. More than anything, they are watching the auto market.

For all practical purposes, some automakers have placed orders for their entire 1960 model run. In other words, steel delivered in May and early June is expected to wind up 1960 model year production.

This, in turn, forecasts July changeovers for many of the automotive divisions and means the new 1961 model dates have been advanced as much as a full month over 1960 models.

Too Severe?—While cutbacks in steel ordering by automakers have been the most serious factor affecting the market, many in the industry believe the cutbacks have been too severe.

Another factor hurting the steel market more than expected is the accumulation by many users of premium steel. (That is, steel purchased through elaborate conversion deals or imported steel to which users are committed.) It may take several months for some users to run through premium steel ordered at the peak of post-strike market crisis.

This factor is also affecting steel warehouses where price cutting threatens to become widespread. Regular warehouses are holding the line, but brokers and importers are selling large tonnages at losses.

General Conditions—Flat-rolled products continue strong. Some major mills have survived cutbacks and are booked solid on cold-rolled sheets through May and even June. But heavy steels show signs of weakening, unless new orders pick up.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,597	2,654	2,674	2,631
Ingot Index				
(1947-1949=100)	161.2	165.2	166.5	163.8
Operating Rates				
North East Coast	87.0	87.0*	94.0	97.0
Buffalo	99.0	103.0*	98.0	101.0
Pittsburgh	94.0	97.0	95.0	96.0
Youngstown	85.0	86.0*	88.0	87.0
Cleveland	102.0	100.0*	102.0	94.0
Detroit	99.0	104.0*	101.0	102.0
Chicago	94.0	98.0*	97.0	94.0
Cincinnati	98.0	100.0*	99.0	82.0
St. Louis	96.0	100.0*	102.0	102.0
South	86.0	87.0	86.0	92.0
West	80.0	82.0*	92.0	86.0
U. S. Rate	91.1	93.1	93.8	92.9

*Revised
Source: American Iron And Steel Institute

Prices At a Glance

(Cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.41	$66.41	$66.41	$66.41
Scrap No. 1 hvy (Gross ton)	$33.50	$33.83	$39.17	$40.83
No. 2 bundles	$22.33	$21.83	$25.17	$28.67
Nonferrous				
Aluminum ingot	28.10	28.10	28.10	26.80
Copper, electrolytic	33.00	33.00	33.00	31.50
Lead, St. Louis	11.80	11.80	11.80	11.30
Magnesium	36.00	36.00	36.00	36.00
Nickel, electrolytic	74.00	74.00	74.00	74.00
Tin, Straits, N. Y.	100.625	100.625	101.875	103.50
Zinc, E. St. Louis	13.00	13.00	13.00	11.00

Adhesives Start Recovery

After a business slowdown during the steel strike, adhesive makers report better conditions.

They are turning to more research and development to better suit customers' needs.

■ Suppliers of industrial adhesives for the automotive, construction and insulation markets felt a softening in business during the steel strike.

A quick recovery is in the making during the first quarter of 1960. But some companies still have anxieties. "Business in January and February was considerably better than 1959," reports an adhesive manufacturer whose income relies heavily on these markets. "But we're fretting again with all this slump talk." He looks for a later-than-usual spring upturn, especially in orders from construction customers.

Steady Price Line — What's the price situation? With few exceptions, nobody is predicting increases in the near future. Because of continued high demand, costs of general purpose adhesives have even dropped in some areas.

There are reports, however, of rising prices for some adhesives based on natural rubber and natural rubber compounds. Raw material costs have climbed steadily in the past six months. "Generally, these prices go up and down in spurts," says a specialist in this field. "But costs have gone up steadily since last fall." He doesn't cite a reason, but guesses it might be due to lower yields and/or higher labor costs in various rubber-producing countries.

Good Future — In general, though, the future appears bright as ever for the industrial adhesive trade. The trend toward prefabricated housing and honeycomb construction is stimulating. Auto and aircraft producers are stepping up their use in structural applications. Demand for contact-type cements in the do-it-yourself, hobby and boat making business is strong.

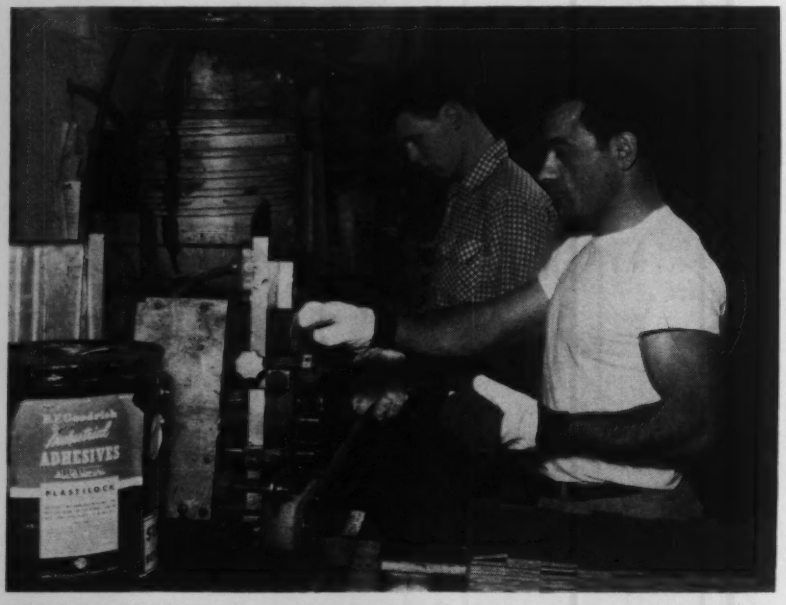
"If we could quickly perfect the new materials and methods our clients want and need, we'd really be in business," is a typical expression of the adhesive maker.

More R & D—Steps along these lines are being taken steadily. At Goodyear Tire & Rubber Co., for example, adhesives took on added importance with the addition of a new department in the Chemical Div., which will explore the needs, production and sales of adhesives.

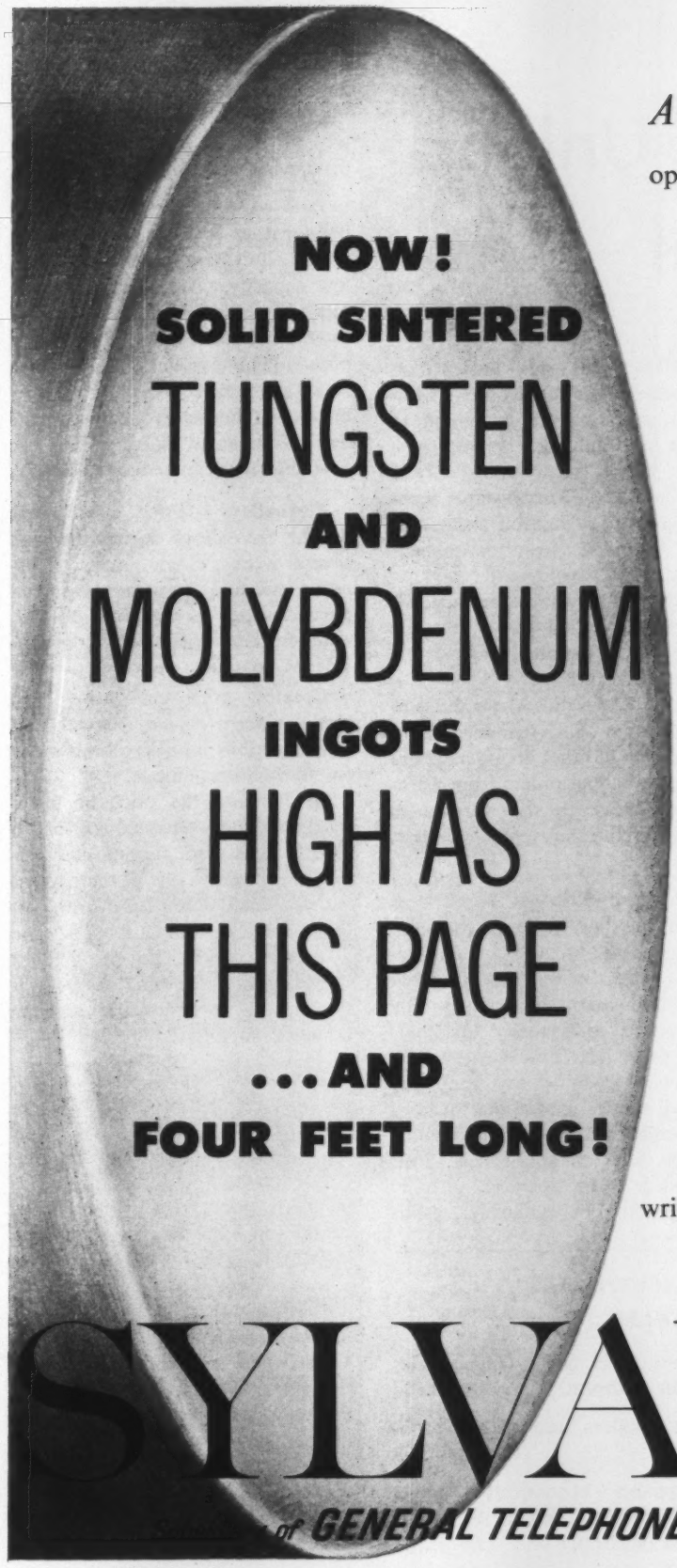
The auto industry is one customer ready to listen to new ideas. Ford Motor Co. says extensive work is underway with chemical suppliers to tailor adhesives to specification applications, and to overcome material and process limitations.

New Method—Biggest move taken by Ford in the 1960 model year is in stampings for hoods and rear deck lids. Two stampings are used, an outer skin and a support piece. In the past, the support was crimped on the edge and spot welded. Often it didn't fit tightly against the skin, and "oil canning," or buckling under pressure, took place. Adding more welds only marred the surface appearance.

On 1960 models, Ford is using a rubber adhesive bonding to make a "sandwich" of the two stampings. Oil canning is eliminated without marring appearance.



BRAKE BOND: Workmen place friction material in a machine that applies adhesive for bonding it to metals. B. F. Goodrich's plastilock is one adhesive used in applications requiring heat resistance.



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Warehouses Unload Distress Steel

Brokers and importers are said to be selling large tonnages of steel at below-cost prices.

But big service centers are holding firm and hope to avoid a general price break.

▪ There are reports of a price break at the warehouse level. Regular steel service centers insist they are holding the line. But brokers and importers are reported selling large tonnages at a loss.

Price cutting is reported in the East and Southwest. And some "bargain" steel is being offered in Pittsburgh.

Quick recovery of domestic mills apparently caught middlemen with large tonnages on hand or coming. Before this could be moved, heavy mill shipments drained off the premium demand.

Below Cost—Holders of the unwanted steel are offering to sell below cost in some cases. This has put pressure on regular service center prices. While there has been no general reduction in warehouse prices, one large supplier admits there is price dickering on most inquiries today.

Warehouses hope to weather the dumping action without a major price break. While it looks as though service center sales in the second quarter may drop 10 to 15 pct under first quarter levels, sales to date have been pretty good.

In the Midwest, January-February sales ran as much as 20 pct above the year ago figures. First returns for March suggest a drop of 5 to 10 pct from the previous month for the entire nation.

Caution Signs — In anticipation of a second quarter drop-off, Midwest warehouses are beginning to stretch out mill orders for some grades which were strong only a few weeks ago. For example, cancellations on galvanized sheets are being received from warehouse buyers.

A Detroit service center specializing in flat-rolled stock says its March orders are about 33 pct less than last month.

And in Cleveland, where the supply situation has remained tight after easing in other areas, mills are getting stretchout orders from warehouses. However, the warehouses are still taking their entire commitments.

Sheet and Strip—It appears as though the big wave of cancellations is past, but mills are still receiving cancellation orders. Even so, mills in many districts say they are booked to capacity for cold-rolled sheets in April. On the **East Coast,** some mills say they are booked solidly into June. And a **Pittsburgh** mill says it is booked through May on cold-rolled sheet; hot-rolled sheet however, is only booked through mid-May. Mills are not always current in **Cleveland** yet. Some orders are going out one to two weeks late, but this is now occurring less frequently. The feeling in **Detroit** is that automakers haven't firmed on second quarter production schedules.

Bars — Mills in the **Pittsburgh** district have capacity bookings for March. But next month will be below capacity. Auto cutbacks have caused screw machine operators around **Detroit** to reduce their orders. This has eased the pinch in small diameter bars which existed at the warehouse level a few weeks ago. Now, small diameter bars are available for immediate delivery.

Ferroalloys — Price cutting has hit the ferroalloys during the past several weeks. Some grades of ferrochrome and ferrochrome-silicon have dropped as much as 15 pct. And further price cuts are considered possible.

Greatest price cuts have been made in ferrochrome, but substantial reductions have also been made for ferrochrome-silicon.

In January, the price of ferromanganese was reduced by $25 a ton. At the time, foreign competition was given as one of the reasons for the reduction. In the present case, foreign competition is also given as a reason. But the greatest impetus for lowering prices is thought to be competition among domestic suppliers.

Plate and Shapes—Producers of heavy steels in **Pittsburgh** insist demand hasn't collapsed. They say they will run at capacity this month. And one mill says it now has enough orders for wide flange beams for April to ensure capacity operations. Sheared plates are only a little behind. Admittedly, standard structurals are lagging. The picture is the same on the **East Coast** where mills offer delivery in a few weeks on standards. Standards are available on short notice in the **Midwest,** also. Customers have been telling mills there to fill the orders fast or they'll get it from an importer who has structurals warehoused locally.

PURCHASING AGENT'S CHECKLIST

Japanese steel mills launch sales drive in Midwest. P. 64

Small suppliers face special problems. P. 68

Government economists predict most prices will remain steady for the rest of 1960. P. 81

COMPARISON OF PRICES

(Effective March 15, 1960)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	Mar. 15 1960	Mar. 8 1960	Feb. 16 1960	Mar. 17 1959
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10**	14.10**	14.10**	13.55
Stainl's C-R strip (No. 302)	52.00	52.00	52.00	52.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.65
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchants bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	45.00
Wrought iron bars	14.90	14.90	14.90	14.90
Wires: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 100 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

	Mar. 15 1960	Mar. 8 1960	Feb. 16 1960	Mar. 17 1959
Pig Iron (per gross ton)				
Foundry, del'd Phila.	$70.57	$70.57	$70.57	$70.57
Foundry, Southern Cin'ti	73.87	73.87	73.87	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.07	70.07	70.07	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese, 74-76 pct Mn, cents per lb‡	11.00	11.00	11.00	12.25
Pig Iron Composite: (per gross ton)				
Pig iron	$66.41	$66.41	$66.41	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$34.50	$36.50	$40.50	$44.50
No. 1 steel, Phila. area	35.50	35.50	39.50	37.50
No. 1 steel, Chicago	30.50*	31.50	37.50	40.50
No. 1 bundles, Detroit	30.50*	31.50	37.50	37.50
Low phos., Youngstown	37.50*	38.50	45.50	45.50
No. 1 mach'y cast, Pittsburgh	52.50	52.50	55.50	51.50
No. 1 mach'y cast, Phila.	51.50	51.50	52.50	49.50
No. 1 mach'y cast, Chicago	51.50*	53.50	57.50	55.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$33.50*	$33.83	$39.17	$40.83
No. 2 bundles	22.33*	21.83	25.17	28.67
Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	$14.75-15.50	$14.75-15.50	$14.50-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	33.00	33.00	33.00	31.50
Copper, Lake, Conn.	33.00	33.00	33.00	31.50
Tin, Straits, N. Y.	100.25	100.00	101.875	103.50
Zinc, East St. Louis	13.00	13.00	13.00	11.00
Lead, St. Louis	11.80	11.80	11.80	11.30
Aluminum, virgin ingot	28.10	28.10	28.10	26.80
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. ** Revised.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composites
Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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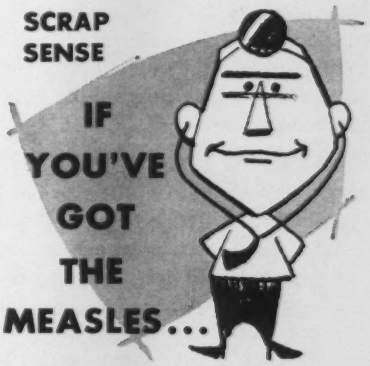
SCRAP SENSE



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Market Keeps on The Downgrade

The downturn that began early in February shows no sign of reversing.

Mills continue restricting purchases and prices keep on declining.

▪ The market continues the slide that began in early February. All the recent trends are still in evidence. Mills are doing very little purchasing. With each new set of buys, prices drop off. In some cases, mills are ignoring dealer scrap and relying on industrial tonnages.

Dealers can't see any signs of volume buying by the mills for some time to come. Further price drops are possible. But there are some factors which may indicate the floor has been reached.

Bundles Dry Up — Yards are about cleaned out on some grades, especially No. 2 bundles. At Pittsburgh, it's reported higher prices will be needed to get dealers to rebuild stocks. In Chicago, No. 2 bundles moved counter to the general market trend, going up $2 a ton. And in the Philadelphia market, No. 2 bundles have held steady for several weeks.

Export sales should form one strong prop under the market in the second quarter. Japanese mills have placed orders for 60 cargoes. On the basis of about 9000 tons to a cargo, this means about 540,000 tons will be exported.

Pittsburgh—Mills are pushing for shipment on old orders. But, in general, shipments have slowed down in this market. So far neither mills nor brokers are willing to bid higher to get delivery. Yards are reported drained, especially of No. 2 bundles. Some dealers feel it will take higher prices to rebuild stocks. But whether these prices will be paid depends on how badly the mills will need scrap. Brokers are convinced more buying is due. Right now, bad weather and low prices have cut the flow of No. 2 bundles into mills.

Chicago—Prices continue to slip down in a weak market. Mill buying exists, but at a slow pace and with constant price adjustments downward. Any hopes the market will rebound are not supported by current activity. A mill buy of No. 2 dealer bundles pegged this grade $2 higher than previous distress sales. But this was the only upward movement in a general market slide.

Philadelphia — Prices on some electric furnace and foundry grades are off in a market drifting downward. No. 1 dealer bundles also fell $1. Mill buying is still limited, with only one mill purchasing at the moment. Export is still fairly active. Two boats are now taking cargoes with another expected in next week. The heavy winter weather has slowed down intake into scrap yards.

New York—Market remains weak. Dealers who last week felt bottom had been reached now aren't so sure. The weakness wasn't enough to lower prices. The exception: Heavy breakable cast which is down $3 on appraisal.

Detroit—Mills are still staying away from dealer scrap. They are apparently getting all they want and need from industrial lists. Dealers don't see any prospect for large-scale buying by mills for some time.

Cleveland—The market dropped another $1 as scrap went begging. Sources are drying up except for production scrap which must be moved from plants. Even this grade is going at a loss. Dealers on the fringe of the area are willing to swallow $8 freight bills in order to ship.

St. Louis—Mills are doing some buying, but scrap offerings still exceed purchases by a wide margin. Prices seem to be leveling off. Dealers believe the bottom has been reached and prices should hold at current levels. But no upturn is expected in the near future.

Cincinnati—A further price drop is expected next month in sympathy with other areas. At the moment the market is quiet. Shipments are being made on old orders and are easily covered by brokers.

Birmingham — Buying is practically at a standstill. Electric furnaces apparently filled their needs with orders delivered earlier this month. Exporters have gotten second quarter orders but have not changed prices.

Buffalo—Prices are unchanged in a market which seems to be levelling off. Bad weather has restricted intake at the yards. As a result dealer inventories have declined slightly. No. 1 busheling, listed last week at $32-$33, should have been $31-$32.

Boston — The market remains quiet. There is some export, but domestic sales are practically nonexistent. A price adjustment raised No. 2 bundles $2. Other prices are unchanged.

West Coast—Some 160,000 tons of scrap will move from West Coast ports to Japan in the second quarter. But even these new orders have brought little cheer to the market. Trade sources predict domestic prices may head lower.

Houston—Prices of melting grades and No. 2 bundles dropped $3 a ton as a local mill bought at lower prices. Generally, the market remains depressed. Foundry buying is off.

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SCRAP PRICES *(Effective March 15, 1960)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	34.00 to 35.00
Machine shop turn.	19.00 to 20.00
Shoveling turnings	24.00 to 25.00
Cast iron borings	23.00 to 24.00
Low phos. punch'gs plate	42.00 to 43.00
Heavy turnings	30.00 to 31.00
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rails, random lgth	52.00 to 53.00
Rails 2 ft and under	57.00 to 58.00
RR specialties	45.00 to 46.00
No. 1 machinery cast	52.00 to 53.00
Cupola cast	47.00 to 48.00
Heavy breakable cast	45.00 to 46.00
Stainless	
18-8 bundles and solids	230.00 to 235.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	125.00 to 130.00
410 turnings	60.00 to 65.00

Chicago

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	30.00 to 31.00
No. 1 factory bundles	35.00 to 36.00
No. 2 bundles	18.00 to 20.00
No. 1 busheling	30.00 to 31.00
Machine shop turn.	14.00 to 15.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Low phos. forge crops	43.00 to 44.00
Low phos. punch'gs plate, ¼ in. and heavier	39.00 to 40.00
Low phos. 2 ft and under	37.00 to 39.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth	45.00 to 46.00
Rerolling rails	53.00 to 54.00
Rails 2 ft and under	52.00 to 53.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	50.00 to 51.00
RR couplers and knuckles	41.00 to 42.00
No. 1 machinery cast	51.00 to 52.00
Cupola cast	43.00 to 44.00
Cast iron wheels	39.00 to 40.00
Malleable	53.00 to 54.00
Stove plate	40.00 to 41.00
Steel car wheels	42.00 to 43.00
Stainless	
18-8 bundles and solids	215.00 to 220.00
18-8 turnings	115.00 to 120.00
430 bundles and solids	115.00 to 120.00
430 turnings	55.00 to 60.00

Philadelphia Area

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	37.00 to 38.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	19.00 to 20.00
Mixed bor. short turn.	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Shoveling turnings	22.00 to 23.00
Clean cast. chem. borings	26.00 to 27.00
Low phos. 5 ft and under	38.00 to 39.00
Low phos. 2 ft punch'gs	41.00 to 42.00
Elec. furnace bundles	38.00 to 39.00
Heavy turnings	29.00 to 30.00
RR specialties	44.00 to 45.00
Rails, 18 in. and under	60.00 to 62.00
Cupola cast	41.00 to 42.00
Heavy breakable cast	42.00 to 43.00
Cast iron car wheels	46.00 to 47.00
Malleable	63.00 to 64.00
No. 1 machinery cast	51.00 to 52.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Cast iron borings	18.00 to 19.00
Low phos. 18 in. and under	42.00 to 43.00
Rails, random length	48.00 to 49.00
Rails, 18 in. and under	55.00 to 56.00
No. 1 cupola cast	43.00 to 44.00
Hvy. breakable cast	36.00 to 37.00
Drop broken cast	53.00 to 54.00

Youngstown

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	16.00 to 17.00
Shoveling turnings	20.00 to 21.00
Low phos. plate	37.00 to 38.00

Cleveland

No. 1 hvy. melting	$32.50 to $33.50
No. 2 hvy. melting	23.50 to 24.50
No. 1 dealer bundles	32.50 to 33.50
No. 1 factory bundles	40.00 to 41.00
No. 2 bundles	19.00 to 20.00
No. 1 busheling	32.50 to 33.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Cut structural & plates, 2 ft & under	39.00 to 40.00
Drop forge flashings	32.50 to 33.50
Low phos. punch'gs plate	33.50 to 34.50
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails 2 ft and under	57.00 to 58.00
Rails 18 in. and under	61.00 to 62.00
Steel axle turnings	24.00 to 25.00
Railroad cast	55.00 to 56.00
No. 1 machinery cast	55.00 to 56.00
Stove plate	48.00 to 49.00
Malleable	52.00 to 53.00
Stainless	
18-8 bundles	210.00 to 220.00
18-8 turnings	90.00 to 100.00
430 bundles	105.00 to 115.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	27.00 to 28.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	22.00 to 23.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	16.00 to 17.00
Low phos. plate	40.00 to 41.00
Structurals and plate, 2 ft and under	40.00 to 41.00
Scrap rails, random lgth	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast	48.00 to 49.00
No. 1 cupola cast	44.00 to 45.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	21.00 to 22.00
Machine shop turn.	13.00 to 14.00
Shoveling turnings	15.00 to 16.00
Cast iron borings	20.00 to 21.00
No. 1 RR hvy. melting	35.00 to 36.00
Rails, random lengths	43.00 to 44.00
Rails, 18 in. and under	47.00 to 48.00
Angles and splice bars	41.00 to 42.00
RR specialties	42.00 to 43.00
Cupola cast	49.00 to 50.00
Heavy breakable cast	37.00 to 38.00
Stove plate	40.00 to 41.00
Cast iron car wheels	39.00 to 40.00
Rerolling rails	54.00 to 55.00
Unstripped motor blocks	39.00 to 40.00

Birmingham

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	37.00 to 38.00
Machine shop turn.	21.00 to 22.00
Shoveling turnings	22.00 to 23.00
Cast iron borings	12.00 to 13.00
Electric furnace bundles	37.00 to 38.00
Elec. furnace, 3 ft & under	35.00 to 36.00
Bar crops and plate	41.00 to 42.00
Structural and plate, 2 ft	40.00 to 41.00
No. 1 RR hvy. melting	33.00 to 34.00
Scrap rails, random lgth	46.00 to 47.00
Rails, 18 in. and under	51.00 to 52.00
Angles and splice bars	44.00 to 45.00
Rerolling rails	51.00 to 52.00
No. 1 cupola cast	49.00 to 50.00
Stove plate	49.00 to 50.00
Cast iron car wheels	39.00 to 40.00
Unstripped motor blocks	38.00 to 39.00

New York

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	22.00 to 23.00
No. 2 dealer bundles	16.00 to 17.00
Machine shop turnings	9.00 to 10.00
Mixed bor. and turn.	10.00 to 11.00
Shoveling turnings	11.00 to 12.00
Clean cast. chem. borings	21.00 to 22.00
No. 1 machinery cast	39.00 to 40.00
Mixed yard cast	36.00 to 37.00
Heavy breakable cast	34.00 to 35.00
Stainless	
18-8 prepared solids	200.00 to 205.00
18-8 turnings	85.00 to 90.00
430 prepared solids	85.00 to 90.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	16.00 to 17.00
No. 1 dealer bundles	30.00 to 31.00
No. 2 bundles	15.00 to 16.00
No. 1 busheling	28.00 to 29.00
Drop forge flashings	28.00 to 29.00
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	13.00 to 14.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Heavy breakable cast	37.00 to 38.00
Mixed cupola cast	43.00 to 44.00
Automotive cast	49.00 to 50.00
Stainless	
18-8 bundles and solids	200.00 to 205.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	85.00 to 90.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$27.00 to $28.00
No. 2 hvy. melting	22.00 to 23.00
No. 1 dealer bundles	27.00 to 28.00
No. 2 bundles	13.00 to 14.00
No. 1 busheling	27.00 to 28.00
Machine shop turn.	5.00 to 6.00
Shoveling turnings	8.00 to 9.00
Clean cast. chem. borings	14.50 to 15.50
No. 1 machinery cast	39.00 to 40.00
Mixed cupola cast	32.00 to 33.00
Heavy breakable cast	31.00 to 32.00

San Francisco

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	31.00
No. 1 dealer bundles	31.00
No. 2 bundles	20.00
Machine shop turn.	15.00
Cast iron borings	15.00
No. 1 cupola cast	46.00

Los Angeles

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	32.00
No. 1 dealer bundles	31.00
No. 2 bundles	16.00
Machine shop turn.	16.00
Shoveling turnings	16.00
Cast iron borings	16.00
Elec. furn. 1 ft and under (foundry)	45.00
No. 1 cupola cast	42.00

Seattle

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	33.00
No. 2 bundles	22.00
No. 1 cupola cast	36.00
Mixed yard cast	36.00

Hamilton, Ont.

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.25
No. 2 hvy. melting	28.25
No. 1 dealer bundles	32.25
No. 2 bundles	24.00
Mixed steel scrap	24.25
Bush., new fact., prep'd	32.25
Bush., new fact., unprep'd	26.25
Machine shop turn.	14.00
Short steel turn.	17.00
Mixed bor. and turn.	13.00
Cast scrap	$46.50 to 48.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$34.00
No. 2 hvy. melting	31.00
No. 2 bundles	19.00
Machine shop turn.	16.00
Shoveling turnings	20.00
Cut structural plate 2 ft & under	$43.50 to $44.50
Unstripped motor blocks	32.00 to 33.00
Cupola cast	39.00 to 40.00
Heavy breakable cast	29.00 to 30.00

for the purchase or sale of **scrap**

Luria Brothers and Company, Inc.

main office **CHRYSLER BUILDING EAST,** *New York, N. Y.*

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READING, PENNA. MODENA, PENNA.

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Nonferrous Experts Look Ahead

New York meeting provides forum for nonferrous leaders to analyze their future markets.

Here's the outlook for lead, zinc, copper and aluminum, as they see it.

▪ What is the outlook for the major nonferrous metals?

Early this week, at the annual convention of the National Assn. of Waste Material Dealers in New York, three top metals men give their viewpoints on what's ahead for their specialties.

Simon D. Strauss, vice president, American Smelting and Refining Co., took on lead and zinc. Lewis P. Favorite, vice president, Aluminum Co. of America, analyzed his product. John J. Lennon, vice president of Amco Div., American Metal Climax, Inc., took a long look at copper.

Lead-Zinc—Mr. Strauss set his predictions against the background of the long-term report of the President's Materials Policy Commission back in 1952. This group was known as the Paley Commission.

The report covered a 25-year period, with 1960 taking it about 40 pct through it's extent. So Mr. Strauss took 40 pct of the Paley report as his yardstick.

For lead, says Mr. Strauss, the best available data indicates the U. S. will fall short (of the Paley prediction), but the rest of the world will exceed the projections.

Lead Use—Mr. Strauss believes the U. S. will use 825,000 to 850,000 tons of primary lead this year. The Paley report estimates consumption at 950,000 tons. The same report estimates all other Free World countries will use 1,105,000 tons; however, Mr. Strauss figures these countries will use up to 1,250,000 tons.

He also predicts U. S. zinc consumption this year will be 1.2 million tons while the Free World will need an additional 1.6 million tons. The Paley report, projected, indicates 1,248,000 tons for the U. S. and 1,318,000 elsewhere.

Next 10 Years—Mr. Strauss suggests lead sales will increase 15 pct in the U. S. and 24 pct elsewhere in the coming decade. For zinc, the prediction is for 15 pct and 25 pct increases.

Mr. Lennon, sales manager of American Metal Climax, notes there was a moderate decline in consumption of copper in the U. S. due to the 1958 recession. At the same time, growth outside the U. S. nearly doubled.

Copper Projection—Mr. Lennon says by 1970 annual consumption of refined copper in the world will have increased by 2 million tons, or about 50 pct.

From 1960 to 1963, there will likely be a surplus of copper produced in the Free World, Mr. Lennon believes. However, he considers this a help for producers "to maintain a steady supply at reasonable prices."

Mr. Favorite, of Alcoa, didn't mention foreign markets, but Bradley Fisk, deputy assistant Secretary of Commerce for International Affairs hit scrap exports.

Aluminum Exports—He pointed out that exports of aluminum scrap in the first two months of 1960 hit 80,000 tons, which more than topped the entire first quarter of 1959. He said that the Dept. of Commerce is now carefully checking to see if some sort of export licensing is in order.

Mr. Favorite did say that the aluminum industry had to continue to expand capacity ahead of its markets to maintain its sharp growth trend.

The Leaders—How fast will markets expand? Building products, now the largest consumer, use 700,000 tons annually. Mr. Favorite says this will be 1 million tons by the mid 1960's. In transportation, the figure of 500,000 tons used in 1959 will be more than doubled in 1970.

In electrical markets, Mr. Favorite figures the current use of 250,000 tons will more than double in a decade. And packaging is definitely headed for outstanding gains. This market last year took 130,000 tons. Mr. Favorite is looking for some breakthroughs here, particularly in aluminum cans.

Tin prices for the week: March 9—100.125; March 10—100.125; March 11—100.125; March 14—100.25*; March 15—100.375*.
*Estimate

Primary Prices

(cents per lb)	current price	last price	date of change
Aluminum pig	26.00	24.70	12/17/59
Aluminum Ingot	28.10	26.80	12/17/59
Copper (E)	33.00	30-33	11/12/59
Copper (CS)	33.00	35.00	3/11/60
Copper (L)	33.00	31.50	11/6/59
Lead, St. L.	11.80	12.30	12/21/59
Lead, N. Y.	12.00	12.50	12/21/59
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	74.00	64.50	12/6/58
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	13.00	12.50	1/8/60
Zinc, N. Y.	13.50	13.00	1/8/60

ALUMINUM: 99% Ingot COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. TIN: See above; Other primary prices, pg. 153.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.038	.048-.061	.077-.096	.136-.250
1100, 3003	47.8	47.3	46.2	45.1
5052	54.2	53.0	50.8	49.2
6061-0	51.0	49.8	47.9	46.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	44.7-46.2	53.2-60.8
18-32	45.2-46.8	57.7-79.9
33-38	48.8-51.4	83.3-94.5
39-44	58.7-62.4	99.9-121.0

Screw Machine Stock—2011-T-3

Size"	¼	⅝-⅝	¾-1	1¼-1½
Price	62.0	61.2	59.7	57.3

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.411	$1.884	$2.353	$2.823
.024 gage	1.762	2.349	2.937	3.524

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	57.13	.....	54.86	58.32
Brass, Yellow	50.57	50.86	50.26	54.23
Brass, Low	53.53	53.82	53.22	57.09
Brass, R L	54.58	54.87	54.27	58.14
Brass, Naval	55.12	.....	48.68	58.78
Munts Metal	53.20	.....	48.26	.....
Comm. Bs.	56.17	56.46	55.86	59.45
Mang. Bs.	58.86	.....	52.21	.....
Phos. Bs. 5%	77.44	.....	78.19	.....

Free Cutting Brass Rod..... 36.06

TITANIUM

(Base prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17.00. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; Bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 29.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $74.75
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $71.50
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.50
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base ... $ 1.31
Cobalt, 97-99% (per lb) ... $1.75 to $1.82
Germanium, per gm, f.o.b. Miami, Okla., refined ..... 29.95 to 36.95
Gold, U. S. Treas., per troy oz.... $35.00
Indium, 99.9%, dollars per troy oz. $2.25
Iridium, dollars per troy oz.... $75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury, dollars per 76-lb flask f.o.b. New York ..... $211 to $214
Nickel oxide sinter at Buffalo, N. Y., or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz.. $24 to $26
Platinum, dollars per troy oz... $82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.)..... 91.375
Thorium, per kg. $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
No. 115 ..... 30.75
No. 120 ..... 29.75
No. 123 ..... 28.75
80-10-10 ingot
No. 305 ..... 35.25
No. 315 ..... 33.00
88-10-2 ingot
No. 210 ..... 44.00
No. 215 ..... 40.75
No. 245 ..... 36.00
Yellow ingot
No. 405 ..... 24.75
Manganese bronze
No. 421 ..... 29.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 25.75-26.00
0.60 copper max. 25.50-25.75
Piston alloys (No. 132 type)... 28.00-29.00
No. 12 alum. (No. 2 grade)... 24.75-25.25
108 alloy 25.25-25.75
195 alloy 27.75-28.75
13 alloy (0.60 copper max.)... 25.75-26.00
AXS-679 (1 pct zinc) 25.00-26.00

(Effective Mar. 15, 1960)

Steel deoxidizing aluminum notch bar granulated or shot
Grade 1—95-97½% 25.25-26.25
Grade 2—92-95% 24.00-25.00
Grade 3—90-92% 23.00-24.00
Grade 4—85-90% 22.50-23.50

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	29	28¼
Yellow brass	22¼	20¼
Red brass	25¾	25
Comm. bronze	26½	26
Mang. bronze	20¾	20
Free cutting rod ends.	21¼	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 26½
No. 2 copper wire 23¾
Light copper 21½
*Refinery brass 21¾
Copper bearing material 21
*Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 26¼
No. 2 copper wire 23½
Light copper 21¼
No. 1 composition 20
No. 1 comp. turnings 19½
Hvy. yellow brass solids 15
Brass pipe 14½
Radiators 16
Aluminum
Mixed old cast. ..... 14½—15½
Mixed new clips ..... 16½—17½
Mixed turnings, dry ..... 15 —16

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

No. 1 copper wire ..... 23 —23½
No. 2 copper wire ..... 20½—21
Light copper ..... 18 —18½
Auto radiators (unsweated). 12½—13
No. 1 composition ..... 16½—17
No. 1 composition turnings.. 15½—16
Cocks and faucets ..... 13 —13½
Clean heavy yellow brass ... 11¾—12¼
Brass pipe ..... 13½—14
New soft brass clippings .... 14 —14½
No. 1 brass rod turnings .... 11½—12

Aluminum

Alum. pistons and struts .... 7½— 8
Aluminum crankcase ..... 11⅛—11¾
1100 (2s) aluminum clippings 15 —15½
Old sheet and utensils ..... 11⅛—11¾
Borings and turnings ..... 7 — 7½
Industrial castings ..... 11¼—11¾
2020 (24S) clippings ..... 12½—13

Zinc

New zinc clippings ..... 7 — 7¼
Old Zinc ..... 4½— 5
Zinc routings ..... 3½— 3½
Old die cast scrap ..... 2¾— 3

Nickel and Monel

Pure nickel clippings 52-54
Clean nickel turnings 40
Nickel anodes 52-54
Nickel rod ends 52-54
New Monel clippings 28-29
Clean Monel turnings 20-23
Old sheet Monel 24-26
Nickel silver clippings, mixed 18
Nickel silver turnings, mixed 15

Lead

Soft scrap lead ..... 8 — 8¼
Battery plates (dry) ..... 3 — 3⅛
Batteries, acid free ..... 2 — 2¼

Miscellaneous

Block tin ..... 75 —76
No. 1 pewter ..... 55 —56
Auto babbitt ..... 39 —40
Mixed common babbitt ..... 9¾—10¼
Solder joints ..... 13¼—13¾
Siphon tops 41
Small foundry type ..... 9¾—10¼
Monotype ..... 9¾—10¼
Lino. and stereotype ..... 8¾— 9
Electrotype ..... 7½— 7¾
Hand picked type shells .... 5¼— 5¾
Lino. and stero. dross ..... 2¼— 2¾
Electro dross ..... 2¼— 2¾

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3 B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$104.50 *A2*	$126.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*		5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Bridgeport, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3,* $114.00 *T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.525 *A1,T8, M8*	7.575 *W8*		8.40 *W8, S9,13*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5,J3*		10.75 *A5*	8.40 *J3*	
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1,P11*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*					5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *J3,B4* 7.525 *E3*			8.40 *S9*	15.55 *S9*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*			6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

(Effective Mar. 15, 1960)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.		Coke* *1.25*-lb. base box	Electro** *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*				7.525 *B3*	9.275 *B3*		6.40 *W6*	† Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price, 0.75 lb./0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. * COKES: 1.50-lb. add 25¢. **ELECTRO: 0.50-lb. add 25¢; 0.75 lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*				7.575 *A2*						
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*				7.575 *U1*	9.325 *U1*			$10.50 *U1*	$9.20 *U1*	
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*	6.775 *B3*		7.525 *B3*	9.275 *B3*	10.025 *B3*	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	
	Worcester, Mass.									6.70 *A5*			
	Trenton, N. J.												
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*	6.775 *A7*		7.525 *A7*						
	Canton-Massillon, Dover, Ohio			6.875 *R1, R3*									
	Chicago, Joliet, Ill.	5.10 *W8, A1*					7.525 *U1, W8*			6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*	7.65 *R3**	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*		6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*				7.525 *G3*	9.275 *G3*					
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*	6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*		6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1, Y1*	7.85 *U1, Y1*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	7.95 *G2*
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*			7.225 *E2*							
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	6.775 *A7*	7.225 *A7*							
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3* 7.65 *R3**	6.775 *S1*	7.225 *S1**, *R3*	7.525 *R3, S1*	9.275 *R3,*				$9.10 *R3*	
	Pittsburgh, Midland, Butler, Donora, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3* 7.50 *E3**	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3*	10.025 *U1, J3*	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	7.85 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5* 7.50 *W3**		7.225 *W3, W5*	7.525 *W3*	9.275 *W3*			$10.40 *W5, W3*	$9.10 *W5, W3*	7.85 *W5*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*	7.50 *J3**	6.775 *Y1*		7.525 *Y1*	9.275 *Y1*		6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*				8.25 *K1*	10.40 *K1*			$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*	6.775 *T2*					6.40 *T2, R3*	$10.50 *T2*	$9.20 *T2*	
	Houston, Texas									6.65 *S2*			

*Electrogalvanized sheets.

(Effective Mar. 15, 1960)

*7.425 at Sharon-Niles is 7.225

STEEL PRICES

Italics identify producers listed in key at end of table. **Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.**

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr'a. Bright
EAST	Bethlehem, Pa.				6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*	5.675 *R3,B3*	7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *C4*		7.50 *C4*	7.95 *C4*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Harrisburg, Pa.							5.30 *P2*	6.375 *P2*			
	Milton, Pa.	5.825 *M7*	5.825 *M7*									
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*	5.675 *B3*		6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Fairless, Pa.	5.825 *U1*	5.825 *U1*		6.875 *U1*							
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.		5.675 *B3*					5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.675 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3* 6.475 *T5*	9.025 *R3,R2* 8.775 *T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*	5.675 *U1,R3, N4,P13,W8* 5.875*L1*	7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*	5.675 *R3*	7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Mich.	5.675 *G3*	5.675 *G3*	7.90 *P3* 7.85 *P8,B5* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5* 9.225 *B5,P3, P8*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*	5.675 *U1,I3, Y1*	7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, I1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.		5.775 *C9*									8.10 *C9*
	Sterling, Ill.	5.775 *N4*	5.775 *N4*					5.30 *N4*				8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*	5.675 *U1,J3*	7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Weirton, Wheeling, Follansbee, W. Va.							5.30 *W5*				
	Youngstown, Ohio	5.675 *U1,R3, Y1*	5.675 *U1,R3, Y1*	7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.425 *J5* 6.375 *K1*	6.425 *J5* 6.375 *K1*		7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*	6.375 *C7,B2*	9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, S12*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*	6.125 *C6*					6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*	6.425 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*	6.375 *C7* 6.425 *B2*				9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*	6.425 *B2,A10*				9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga.	5.875 *A8*	5.675 *A8*									8.90 *A8*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*	5.675 *T2,R3, C16*	8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas	5.925 *S2*	5.925 *S2*		6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective Mar. 15, 1960) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C4 Claymont Products Dept., Claymont, Del.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Chicago, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Steel Corp., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING — **Base discounts (net) f.o.b. mills. Base price about $200 per net ton.**

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Youngstown *R3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fontana *K1*	+10.75	+26.00	+7.75	+22.00	+4.25	+17.50	+1.75	+16.75	+1.25	+15.75	+0.75	+15.25	0.75	+15.50								
Pittsburgh *J3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Alton, Ill. *L1*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Sharon *M3*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Fairless *N2*	0.25	+15.0	3.25	+11.0	6.75	+6.50	9.25	+5.75	9.75	+4.75	10.25	+4.25	11.75	+4.50								
Pittsburgh *N1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Wheeling *W5*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Wheatland *W4*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50								
Youngstown *Y1*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
Indiana Harbor *Y1*	1.25	+14.0	4.25	+10.0	7.75	+5.50	10.25	+4.75	10.75	+3.75	11.25	+3.25	12.75	+3.50								
Lorain *N2*	2.25	+13.0	5.25	+9.0	8.75	+4.50	11.25	+3.75	11.75	+2.75	12.25	+2.25	13.75	+2.50	+12.25	+27.25	+5.75	+22.50	+3.25	+20.0	+1.75	+18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Youngstown *R3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Fontana *K1*	+6.25		+2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Alton, Ill. *L1*	4.75	+9.0	8.75	+5.0	11.75	+0.50	12.25	+1.75	12.75	+0.75	13.25	+0.25	13.75	+1.50								
Sharon *M3*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Wheeling *W5*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50
Indiana Harbor *Y1*	5.75	+8.0	9.75	+4.0	12.75	0.50	13.25	+0.75	13.75	0.25	14.25	0.75	14.75	+0.50								
Lorain *N2*	6.75	+7.0	10.75	+3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	+10.75	+24.75	+3.25	+19.0	+0.75	+16.50	4.25	+11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.00¢ per lb.

(Effective Mar. 15, 1960)

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb	SAE
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium..					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*L4, C4, A3, J2*) 10 pct	15 pct	20 pct	Sheet (*I2*) 20 pct
Stainless Type	302	.....	.....	.....	37.50
	304	28.80	31.55	34.30	40.00
	316	42.20	46.25	50.25	58.75
	321	34.50	37.75	41.05	47.25
	347	40.80	44.65	48.55	57.00
	405	24.60	26.90	29.25	.....
	410	22.70	24.85	27.00	.....
	430	23.45	25.65	27.90	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 44.20; 1 side, 36.80.

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	5.75	6.725	7.25	.....	.....	.....
Cleveland *R3*	.....	.....	.....	.....	.....	15.35
So. Chicago *R3*	.....	.....	.....	10.10	.....	.....
Ensley *T2*	5.75	6.725	.....	.....	.....	.....
Fairfield *T2*	.....	6.725	.....	10.10	6.875	.....
Gary *U1*	5.75	.....	.....	.....	6.875	.....
Huntington, *C16*	.....	6.725	.....	.....	.....	.....
Ind. Harbor *I5*	.....	.....	.....	10.10	.....	.....
Johnstown *B3*	.....	6.725	.....	.....	.....	.....
Joliet *U1*	.....	.....	7.25	.....	.....	.....
Kansas City *S2*	.....	.....	.....	10.10	.....	15.35
Lackawanna *B3*	5.75	6.725	7.25	.....	6.875	.....
Lebanon *B3*	.....	.....	7.25	.....	.....	15.35
Minnequa *C6*	5.75	7.225	7.25	10.10	6.875	15.35
Pittsburgh *S14*	.....	.....	.....	.....	.....	15.35
Pittsburgh *J3*	.....	.....	.....	10.10	.....	.....
Seattle *B2*	.....	.....	.....	.....	6.75	15.85
Steelton *B3*	5.75	.....	7.25	.....	6.875	.....
Struthers *Y1*	.....	.....	.....	10.10	.....	.....
Torrance *C7*	.....	.....	.....	.....	6.75	.....
Williamsport *S5*	.....	6.725	.....	.....	.....	.....
Youngstown *R3*	.....	.....	.....	10.10	.....	.....

COKE

Furnace, beehive (f.o.b.) Connellsville, Pa.	Net-Ton $14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Ironton, O., f.o.b.	30.50
Detroit f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearney, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St. Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1959 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Fully Processed
Field		9.875	
Armature	11.70	11.20	11.70
Elect.	12.40	11.90	12.40
Special Motor		12.475	
Motor	13.55	13.05	13.55
Dynamo	14.65	14.15	14.65
Trans. 72	15.70	15.20	15.70
Trans. 65	16.30	Grain Oriented	
Trans. 58	16.80	Trans. 80	19.70
Trans. 52	17.85	Trans. 73	20.20
		Trans. 66	20.70

Producing points: Aliquippa (*J3*); Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*A9*); Niles, O. (*S1*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville, Butler (*A7*).

ELECTRODES

Cents per lb. f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE Diam. (In.)	Length (In.)	Price	CARBON* Diam. (In.)	Length (In.)	Price
24	84	27.25	40	100,110	12.50
20	72	26.50	35	110	11.20
18	72	27.50	30	110	11.70
14	72	27.25	24	72	11.95
12	72	28.25	20	90	11.55
10	60	29.50	17	72	12.10
10	48	30.00	14	72	12.55
7	60	29.75	10	60	13.80
6	60	33.25	8	60	14.25
4	40	37.00			
3	40	39.25			
2½	30	41.50			
2	24	64.00			

* Prices shown cover carbon nipples.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

Super duty, Mo., Pa., Md., Ky.	$185.00
High duty (except Salina, Pa., add $5.00)	140.00
Medium duty	125.00
Low duty (except Salina, Pa., add $2.00)	103.00
Ground fire clay, net ton, bulk	22.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$158.00
Childs, Hays, Latrobe, Pa.	163.00
Chicago District	168.00
Western Utah	183.00
California	165.00
Super Duty Hays, Pa., Athens, Tex., Windham, Warren, O., Morrisville	163.00-168.00
Silica cement, net ton, bulk, Latrobe	29.75
Silica cement, net ton, bulk, Chicago	26.75
Silica cement, net ton, bulk, Ensley, Ala.	27.75
Silica cement, net ton, bulk, Mt. Union	25.75
Silica cement, net ton, bulk, Utah and Calif.	39.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.	$109.00
Standard chemically bonded, Curtiner, Calif.	119.00
Burned, Balt.	103.00

Magnesite Brick

Standard, Baltimore	$140.00
Chemically bonded, Baltimore	119.00

Grain Magnesite

St. ⅜ to ½-in. grains

Domestic, f.o.b. Baltimore in bulk.	$73.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev. in bulk	46.00
in sacks	52.00-54.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:	
Pa., W. Va., Ohio	$16.75
Missouri Valley	15.60
Midwest	17.00

(Effective Mar. 15, 1960)

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard Q Coated Nails Col	Woven Wire Fence Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	175	192	...	214	198	8.75	9.425
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4***	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	193	...	214	199	9.10	9.85
Donora, Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2*	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	184-1	197	...	219	203	9.10	9.775
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet, Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9*	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2*****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	...	...	213	9.95	10.50
Rankin, Pa. *A5*	173	187	...	...	193	9.00	9.55
So. Chicago *R3*	173	187	...	...	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50†
SparrowsPt. *B3***	175	.....	...	214	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Anderson, Ind. *G4*	8.95	10.40	12.60	15.60	18.55
Baltimore, Md. *T8*	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. *W12*	.....	10.70	12.90	16.10	19.30
Boston *T8*	9.50	10.70	12.90	15.90	18.85
Buffalo, N. Y. *R7*	8.95	10.40	12.60	15.60	18.55
Carnegie, Pa. *S9*	8.95	10.40	12.60	15.60	18.55
Chicago	.....	.....	.....	15.60	.....
Cleveland *A5*	8.95	10.40	12.60	15.60	18.55
Dearborn *S1*	9.05	10.50	12.70	.....	.....
Detroit *D1*	9.05	10.50	12.70	15.70	.....
Detroit *D2*	9.05	10.50	12.70	.....	.....
Dover, O. *G4*	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. *M8*	9.05	10.40	12.60	.....	.....
Franklin Park, Ill. *T8*	9.05	10.40	12.60	15.60	18.55
Harrison, N. J. *C11*	.....	.....	12.90	16.10	19.30
Indianapolis *R5*	9.10	10.55	12.60	15.60	18.55
Los Angeles *C1*	11.15	12.60	14.80	17.80	.....
New Britain, Conn. *S7*	9.40	10.70	12.90	15.90	18.85
New Castle, Pa. *B4*	8.95	10.40	12.60	15.60	.....
New Haven, Conn. *D1*	9.40	10.70	12.90	15.90	.....
Pawtucket, R. I. *N7*	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. *A1*	9.05	10.40	12.60	15.60	18.55
Sharon, Pa. *S1*	8.95	10.40	12.60	15.60	18.55
Trenton, *R4*	.....	10.70	12.90	16.10	19.30
Wallingford *W1*	9.40	10.70	12.90	15.90	18.55
Warren, Ohio *T4*	8.95	10.40	12.60	15.60	18.75
Worcester, Mass. *A5*	9.50	10.70	12.90	15.90	18.85
Youngstown *R5*	9.10	10.55	12.60	15.60	18.55

BOILER TUBES

$ per 100 ft. carload lots cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
Babcock & Wilcox	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
National Tube	2	13	40.28	47.21	35.74
	2½	12	54.23	63.57	48.13
	3	12	62.62	73.40	55.59
	3½	11	73.11	85.70	65.84
	4	10	97.08	113.80	88.10
Pittsburgh Steel	2	13	40.28	47.21	.....
	2½	12	54.23	63.57	.....
	3	12	62.62	73.40	.....
	3½	11	73.11	85.70	.....
	4	10	97.08	113.80	.....

METAL POWDERS

Cents per lb, minimum truckload, delivered E. of Miss. River, unless otherwise noted.

Iron Powders

Compacting Powders

Electrolytic, imported, f.o.b.	29.50 to 33.00
Electrolytic, domestic	34.50
Sponge	11.50
Atomized	11.25
Hydrogen Reduced	11.25 to 12.00
Carbonyl	88.00
Welding Powders*	8.10
Cutting and Scarfing Powders*	9.10

Copper Powders

Molding Grades

Electrolytic, domestic f.o.b. shipping point	49.25
Precipitated	47.50
Atomized	39.80 to 48.30
Hydrogen reduced, f.o.b.	49.25
Bronze	47.20 to 51.50
Chromium, electrolytic	$5.00
Lead	19.00
Manganese, f.o.b.	42.00
Molybdenum	$3.60 to $3.95
Nickel	$1.05 to $1.03
Nickel Silver	53.50
Nickel Steel	13.00
Solder	13¢ plus metal value
Stainless Steel, 302	$1.07
Stainless Steel, 316	$1.26
Steel, atomized, prealloyed, 4600 series	14.00 plus metal value
Tin	14¢ plus metal value
Titanium, 99.25+%, per lb., f.o.b.	$11.25
Tungsten	$3.15 (nominal)

* F.O.B., shipping point.

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Pct. Discounts

Bolts	1-4 Containers	5 Containers	20,000 Lb.	40,000 Lb.
Machine				
½" and smaller x 3" and shorter	55	57	61	62
⅝" diam. x 3" and shorter	47	49½	54	55
¾" thru 1" diam x 6" and shorter	37	39½	45	46
¾" thru 1" diam. longer than 6" and 1½" and larger x all lengths	31	34	40	41
Rolled thread, ½" and smaller x 3" and shorter	55	57	61	62
Carriage, lag, plow, tap, blank, step, elevator and fitting up bolts ½" and smaller x 6" and shorter	48	50½	55	56

Note: Add 25 pct for less than container quantity. Distributor prices are 5 pct less on bolts and square nuts.

Nuts, Hex, HP reg. & hvy.	Full case or Keg price
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
C. P. Hex, reg. & hvy.	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½
Hot Galv. Hex Nuts (All Types)	
¾ in. and smaller	41
Semi-finished Hex Nuts	
¾ in. or smaller	62
⅞ in. to 1½ in. inclusive	56
1⅝ in. and larger	51½

(Add 25 pct for broken case or keg quantities)

Finished	
⅞ in. and smaller	65

Rivets	*Base per 100 lb*
½ in. and larger	$12.85
	Pct. Off List
7/16 in. and smaller	15

Cap Screws	*Discount (Packages)*
	Full Finished H. C. Heat Treat
New std. hex head, packaged	Full Case
⅝" diam. and smaller x 6" and shorter	54
¾", ⅞", and 1" diam. x 6" and shorter	38
⅝" diam. and smaller x longer than 6"	..
¾", ⅞", and 1" diam. x longer than 6"	..

	C-1018 Steel Full-Finished Cartons	Bulk
¼" through ⅝" dia. x 6" and shorter	59	48
¾" through 1" dia. x 6" and shorter	45	32

Minimum quantity—¼" through ⅜" diam., 15,000 pieces; 7/16" through ⅝" diam., 5,000 pieces; ¾" through 1" diam., 2,000 pieces.

Machine Screws & Stove Bolts

Plain Finish	Discount Mach. Screws	Stove Bolts
Cartons	60	60
Bulk		
Quantity		
To ¼" diam. incl. 25,000-and over	60	..
5/16 to ½" diam. incl. 15,000-200,000	60	..

Machine Screws & Stove Bolt Nuts

	Discount Hex	Square
In Cartons	16	19
Quantity		
In Bulk		
⅜" diam. & smaller 25,000-and over	15	16

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper	
Rolled elliptical, 18 in. or longer, 5000 lb lots	48.00
Electrodeposited	40.00
Brass, 80-20, ball anodes, 2000 lb or more	53.00
Zinc, ball anodes, 2000 lb lots	19.75
(for elliptical add 1¢ per lb)	
Nickel, 99 pct plus, rolled carton, 5000 lb	1.0225
(Rolled depolarized add 3¢ per lb)	
Cadmium, 5000 lb	1.30
Tin, ball anodes $1.05 per lb (approx.).	

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	65.90
Copper sulphate, 100 lb bags, per cwt.	27.75
Nickel salts, single, 100 lb bags	36.00
Nickel chloride, freight allowed, 100 lb	45.00
Sodium cyanide, domestic, f.o.b. N. Y., 200 lb drums	23.70
(Philadelphia price 25.00)	
Zinc cyanide, 100 lb	60.75
Potassium cyanide, 100 lb drum N. Y.	45.50
Chromic acid, flake type, 10,000 lb or more	30.44

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.5
Chicago	139.8
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 5 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

STEEL SERVICE CENTERS

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery‡ Charge	Sheets: Hot-Rolled (18 ga. & hvr.)	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)††	Strip: Hot-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled (merchant)	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Atlanta		8.59	9.87	10.13	8.91	9.29	9.40	9.39	13.24	.....	.....	.....	.....
Baltimore**	.5.10	8.63	10.10	10.16	11.04	9.25	10.02	9.43	11.90	17.48	16.48	21.58	20.83
Birmingham**		9.43	10.20	10.46	10.41	9.29	9.50	9.09	13.14	16.76	.....	.....	.....
Boston**	.10	10.52	11.27	11.87	12.17	10.42	10.72	10.34	13.45	17.69	16.69	21.79	21.04
Buffalo**	.15	8.95	10.10	11.30	10.80	9.15	9.80	9.15	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	8.69	10.35	11.10	10.35	8.62	9.24	8.79	10.80	17.10	16.10	19.70	20.45
Cincinnati**	.15	8.86	10.41	11.10	10.67	9.00	9.84	9.11	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	8.88[1]	10.03	11.29	10.66	9.07	9.90	9.11	11.40	17.21	16.21	21.31	20.56
Denver	.20	9.60	11.84	12.94	9.63	9.96	10.04	10.00	11.19	.....	.....	.....	20.84
Detroit**	.15	8.95	10.61	11.45	10.72	8.99	9.84	9.10	11.16	17.38	16.38	21.48	20.73
Houston**		9.67	10.41	12.193	11.28	9.47	9.34	9.13	13.10	17.50	16.55	21.55	20.85
Kansas City**	.15	9.36	11.02	11.50	11.02	9.25	9.95	9.46	11.72	17.17	15.87	21.87	21.12
Los Angeles**		9.95[1]	11.55	12.20	11.55	10.00	10.00	9.75	14.20	18.30	17.35	22.90	22.20
Memphis	.15	8.55	9.80	.....	8.60	8.93	9.01	8.97	12.11	.....	.....	.....	.....
Milwaukee**	.15	8.83	10.49	11.24	10.49	8.76	9.50	8.93	11.04	17.24	16.24	21.24	20.49
New York	.10	9.46	10.23	11.45	11.56	9.61	10.30	9.84	13.35	16.16	16.50	20.10	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.20	10.10	10.99	11.20	9.65	9.95	9.60	12.05	16.58	16.48	20.08	20.03
Pittsburgh**	.15	8.88	10.03	11.18	10.64	8.83	9.51	9.00	11.40	17.10	16.10	19.70	20.45
Portland		10.00	11.75	13.30	11.95	11.50	11.10	9.85	15.30	18.50	17.45	20.75	20.25
San Francisco**	.10	11.00	11.95[2]	11.65	12.25	11.00	10.95	10.75	15.20	18.30	17.35	22.90	22.20
Seattle**		11.55	12.30	12.50	12.65	11.00	10.20	11.10	16.20	18.60	17.80	22.70	22.20
Spokane**	.15	11.70	12.45	12.65	13.30	11.15	11.35	11.75	16.35	17.75	17.95	21.58	22.35
St. Louis**	.15	8.79	10.73	11.48	10.45	8.73	9.40	8.90	11.43	17.48	16.48	21.58	20.83
St. Paul**	.15	9.19	9.74	10.89	10.81	9.10	9.78	9.27	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. ** These cities are on net pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—⅛" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—⅜-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅛" to 2⅞"; cold drawn—15/16" to 2⅞" round; Hot-rolled 4140—⅞" to 2⅞" round, cold drawn—15/16" to 2⅞" round.

†† 13¢ zinc. ‡ Deduct for country delivery. [1] 15 ga. & heavier; [2] 14 ga. & lighter. [3] 10 ga. x 48 — 120.

(Effective Mar. 15, 1960)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	.....
Birmingham *R3*	62.00	62.50*	.....	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Everett *M6*	67.50	68.00	68.50	.....	.....
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	73.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, (Globe Div.), $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add $1.00 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 18 pct. Add $1.00 for each 0.50 pct manganese over 1.00 pct. Bessemer silvery pig iron (under .10 pct phos.); $64.00.

† Intermediate low phos.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	28.00	31.50	29.00	32.75	33.25	34.50	51.25	41.50	48.25	—	22.25	—	22.50
Billets, forging	—	37.75	38.75	39.50	42.50	42.00	64.50	48.75	57.75	29.25	29.25	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	49.50	75.75	57.50	67.25	35.00	35.00	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	31.75 48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	44.25	69.25	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	45.00	49.25	47.50	52.00	56.75	55.00	80.75	65.50	79.25	40.25	40.25	42.50	40.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	47.00	71.75	54.50	63.75	33.25	33.25	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R3;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge, Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

(Effective Mar. 15, 1960)

HAYWARD ELECTRIC MOTOR BUCKETS

Work Longer, Work Faster, Wear Less!

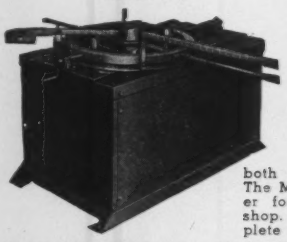
Hook onto any electric over-head crane...need no latches, hand lines, ropes or limit switches...can't discharge accidentally while being traversed...operates without need of circuit breakers...motor enclosed against dust, soot and weather...steel and bronze construction...can operate in pits or high-sided cars...*plus many other cost-cutting design features!*

Write for illustrated bulletin giving complete details including sizes, weights and dimensions.

THE HAYWARD COMPANY
50 CHURCH ST., DEP'T I, NEW YORK 7, N. Y.
Builders of Better Buckets Since 1888

KARDONG FOUR-WAY BENDER
For Concrete Reinforcing Steel

Model D-2



The Model D-2 Kardong Bender is a Four Direction Horizontal Bender. With this bender it is not necessary to turn bars over to make reverse or second bends on beam bars. The Model D-2 is made in two sizes. Model D-2 Standard 6-inch, which will bend bars around collars 2-inch to 6-inch and Model D-2 Special 8-inch, which will bend bars around collars 2-inch to 8-inch. Capacity of both models, 1¼-inch Square Bars. The Model D-2 is a production bender for reinforcing steel fabricating shop. Ask for catalog of our complete line of reinforcing bar benders.

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GOSS and DE LEEUW
MULTIPLE SPINDLE
CHUCKING MACHINES
Tool Rotating
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN.

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 67-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	32.75
0.05% C....	33.50	1.00% C....	32.50
0.10% C....	33.25	1.50% C....	32.25
0.20% C....	33.00	2.00% C....	32.00

4.00-4.50% C, 60-70% Cr, 1-2% Si. 28.75
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si 28.25
0.025% C (Simplex) 31.50
5-7% C, 61-65% Cr, 5-8% Si 22.00
5% max C, 50-55% Cr, 2% max Si.. 25.00

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed, delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads $1.15
Ton lots 1.17
Less ton lots 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.) Carloads, delivered, lump, 3-in. x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	24.50	14.60
Ton lots	29.75	16.05
Less ton lots	31.35	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk 24.00
Ton lots 27.95
Less ton lots 29.45

Calcium-Manganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk 23.00
Ton lots 26.15
Less ton lots 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots 21.15
Less ton lots 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots 18.45
Ton lots 19.95
Less ton lots 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk 19.20
Ton lots to carload packed 21.15
Less ton lots 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk 13.70
Ton lots packed in bags 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

	Palmerton, Pa. 10 lb, 35 lb, down	Neville Is., Pa. 35 lb
Mn		
16-19% ..	$98.00 $96.00	$100.50
19-21% ..	100.00 98.00	102.50
21-23% ..	102.50 100.50	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed 45.75
Ton lots 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk 34.25
Ton lots, palletized 36.25
250 to 1999 lb 39.00
Premium for Hydrogen - removed metal 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% (Bulk) P, 90% Mn	37.15	39.95	41.15
0.07% max. C	35.10	37.90	39.10
0.10% max. C	34.35	37.15	38.35
0.15% max. C.	31.10	33.90	35.10
0.30% max. C	29.80	32.60	33.80
0.50% max. C	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si ...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk 11.60
Ton lots, packed 13.25
Carloads, bulk, delivered, per lb of briquet 14.00
Briquets, packed pallets, 2000 lb up to carloads 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe..	22.95	21.65
98% Si, 1.0% Fe	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk 8.00
Ton lots, packed 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	14.60	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth 3.20
Crucible 3.30
High speed steel 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
100 to 1999 lb..	2.40	3.30	4.55

(Effective Mar. 15, 1960)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y., per lb.
Carloads, bulk ..... 9.85¢
Ton lots ..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, delivered per pound
Ton lots $3.45
Less ton lo* 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton $120.00
10 tons to less carload $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Cambridge, O., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots $1.54

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $255.00

Ferrotungsten, ¼ x down packed, per pounds contained W, ton lots delivered ..... $2.15 (nominal)

Molybdic oxide, briquets per lb contained Mo, f.o.b. Langeloth, Pa. $1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.
Carload, bulk lump ..... 18.50¢
Ton lots, packed lump ..... 20.50¢
Less ton lots ..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5 .... $1.38

Zirconium silicon, per lb of alloy 35-40% del'd. carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads ..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B
2000 lb carload $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound ..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.
Ton lots per pound ..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots. $1.20
F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B ..... .85
14 to 19% 1.20
19% min. B 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb and over
No. 1 ..... $1.05
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.
Ton lots (packed) $1.46
Less ton lots (packed) 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots 2.15

ELECTRICAL POWER
EQUIPMENT IN STOCK

DC MOTORS

Qu.	H.P.	Make	Type	Volts	RPM
1	3900	New G.E.	Enc. S.V.	475	320
1	3000	New Whse.	Enc. F.V.	525	600
2	2700	G.E.	Enc. S.V.	415	280
1	2250	New G.E.	Enc. S.V.	600	200/300
1	2200	G.E.	Enc. S.V.	600	400/500
2	2000	G.E.	Enc. S.V.	350	230/350
2	1750	G.E.	Enc. S.V.	250	175/350
2	1500	Whse.		600	300/700
4	1500	New Whse.	Enc. F.V.	525	600
2	1400	G.E.	MCF	250	165/300
1	1300	G.E.	MCF-12	300	200/400
1	1200	G.E.	MCF	600	450/600
1	1000	Whse.		500	800/2000
4	1000	GM	D8	600	600/900
2	900	G.E.	MCF	250	180/360
1	850	G.E.	MCF	250	85/170
2	800	G.E.	MCF	250	400/750
2	800	G.E.	MCF	250	780
2	750	G.E.	MCF	600	450/900
1	750	G.E.	M.F.	600	120/360
2	645	S.S.	V.G.	300	1000
4	600	Whse.		250	275/550
1	500	G.E.	MPC-10	250	188/400
2	450	Whse.		550	415
4	400	GM.	D8	250	300/900
2	400	G.E.	CY-275	300	1000/1500
1	300	Cr. Wh.	H-102 B.B.	230	1200
1	150	Cr.Wh.	CMC-65H	230	1150
1	150	G.E.B.B.	CD	600	250/750
1	150	G.E.B.B.	CDP-125	230	1750
1	125	Cont. B.B.		230	1750
1	100	Whse.	SK-180	230	450/1100
1	100	G.E.	CDP-115	230	1750
1	80	Whse.	SK-123.9	240	2000-4500
1	75	G.E.B.B.	CD-1235-D.P.	600	850

SWITCH GEAR

Large Stock Oil & Air C/BC can furnish in NEMA 2 Enc. or Open Magnetic or Manual Operation. What are your needs & I.C. Requirements.

MG SETS—3 Ph. 60 CY.

Qu.	K.W.	Make	RPM	DC Volts	AC Volts
1	4800	G.E.	450	300	2300/4600
1	2400	G.E.	450	300	2300/4600
1	2000	G.E.	514	600	2300/4600
2	1750/2100	G.E.	514	250/300	2300/4600
1	1750	G.E.	514	600	2300/4600
1	1500	G.E.	720	600	6600/13200
1	1500	Cr.Wh. 4 unit	720	100	2300
1	500	G.E.	900	125/250	440
1	500	G.E.	900	250	2300/4600
1	500 (New)	G.E.	1200	300	2300
1	350	G.E.	900	125	440/2300/4160
1	300	G.E.	1200	250	2300/4000
1	300	G.E.	1200	250	440/2300
1	250	G.E.	900	250	440/2300
1	240	Whse.	900	125	220/440
1	200	Whse.	1200	550	2200
1	200	El. Mhy.	1200	250	2300/4600
1	150	G.E.	1200	275	2300
1	150	Whse.	1200	275	2300
1	150	G.E.	1200	250	440
1	150	G.E.	1200	125	440
	140	Cr.Wh.	690	125/250	2300
1	100	G.E.	1170	250	220/440
2	100	Cr.Wh.	S1160	525	220/550
1	100	G.E.	1200	250	2400/4100
2	75	Whse.	1200	125	440

TRANSFORMERS

Qu.	KVA	Make	Type	Ph.	Voltages
3	3333	Whse.	OISC	1	13800 x 2300
1	3000	A.C.	OISC	3	34500 x 2300
3	1000	G.E.	OA/FA	1	13800 x 230/460
3	833	A.C.	OISC	1	4800/2400 x 480
3	833	A.C.	OISC	1	10175/13475x 2300/4000
2	750	G.E.	Pyranol	1	4800x85/55-255/165
3	500	Mal.	C	1	6600/11430Yx480
3	500	Kuhl	OISC	1	13200 x 6600
3	150	G.E.	OISC	1	3300x2300/4000Y
3	100	G.E.	HS	1	4800/8320Y x 120/240

CRANE & MILL MOTORS
230 V. D. C.

Qu.	H.P.	Make	RPM	Type
12	12/14	Whse.	700/600	MCA-30, Series
1	20	Whse.	975	K-5 Series
2	23	G.E.	650	MD8-408 Shunt
1	35	Whse.	480	CK-9 Comp. S.B.
1	35	Whse.	480	CK-9 Sh. R.B.
1	45	Whse.	600	CK-9 Comp. S.B.
3	50	G.E.	650	COM-1830 Comp.
2	50	Whse.	525	CK-9 Shunt R.B.
2	50	Whse.	600	CK-9 Comp. R.B.
1	50	G.E.	525	COM-1830AEB.B.
1	50	Cr.Wh.	550	SW-50 Comp.
9	125/165	G.E.	625/575	CO-1832 Ser.
1	100	G.E.	475	CO-1832 S.B.
6	100-140	Whse.	500/415	MC-90 R.B.

Above only partial listing of our available stock.

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Chicago Area Sales Reported Slow

Used machine dealers in the Chicago area say business isn't up to seasonal expectations.

Machine rebuilding is off, too, and many jobs have been postponed.

▪ Midwest used tool dealers report that, for the second month, sales have not shown the gains expected earlier. Unless business picks up in the next two weeks, a number of shops will show an actual dropoff in March business levels as compared with the sales level in February.

Not the Trend—What happened? Machine tool sales generally begin moving up in January and continue to rise through March. April and May are slow months and business comes back up again during June. The box score at the moment: February sales showed a gain, but not the gain that had been expected. March sales are showing no gain and many dealers feel they'll finish the month with a dropoff.

The same trend is extending into rebuilt tools. Rebuilders continue to work a five day week, but report that backlogs are just about the same. Customers who had indicated they'd be sending in tools for rebuilding this month, have now postponed shipping the equipment for at least 2-3 months, in some cases.

Inquiries Down—A few "indefinite postponements" are reported. At the same time, inquiries are down at the lowest point they've hit thus far this year. This trend has been developing very gradually over the past 60 days. But it now appears widespread and is causing some real gloom.

Business, if it's avoiding the normal seasonal pattern, is not bad. Sales to out-of-area customers are holding surprisingly well. A number of shops report they've been able to move some heavy production equipment, and this has kept dollar volume relatively high despite the fact that they are closing fewer sales. Business dropoffs, thus far, have been confined largely to toolroom equipment.

Weather Story—Is it the weather? One dealer reports that bad weather has cut purchases by firms manufacturing building goods. And that on the few sunshiny days, he had quite a few potential buyers drop in. This is hopeful, but doesn't check out with the fact that rebuilders, who work on longer lead times, are losing business that would have been delivered as far in the future as May, June and July.

Another hopeful sign: Prices are fairly firm. This would suggest a hopeful outlook. It's counterbalanced, however, by the fact that dealer buying of additional inventory is moving at a slow and careful pace.

Nor is tight money the factor that's keeping prospective buyers glued to their home office chairs. In almost no cases do dealers find significant demand for loan extensions, or customers who complain at the currently high rate of interest. Money is costly enough to slow up some customer buying, but not costly enough to account for the depth of the current sales slowdown.

CONSIDER GOOD USED EQUIPMENT FIRST

BALER
No. 1-A Harris, Box 60"x22"x18", Finished Bale 10"x12"x16" Approx.

BENDER
Wallace 500—4⅝, with Hydraulic Mandrel Extractor Unit

BENDING ROLLS
13' x 3/16" Bertsch Initial Type
32' x ¾" Baldwin Pyramid Type

CRANES—OVERHEAD ELECTRIC TRAVELING

3 ton P&H Floor Control	56' 8"	Span	220/3/60
5 ton Whiting	55'	Span	220/3/60
10 ton P&H With 2—5 ton Trolleys	55'	Span	220/3/60
10 ton Shaw Box With 280° "A" Frame Runway	125'	Span	230 Volt
15 ton Shepard Niles	36' 6"	Sapn	220/3/60
15 ton Shepard Niles With 5 ton Auxiliary	37' 9"	Span	220/3/60
15 ton Shepard Niles With 5 ton Auxiliary	55' 6"	Span	220/3/60
40 ton P&H With two 20 ton Trolleys	75'	Span	440/3/60

BORING MILL
#56 Giddings & Lewis 6" Horizontal Table 16" x 34"

BRAKES—PRESS TYPE
10' x ½" Cincinnati
12' x ⅝" Cincinnati

DIEING MACHINES
60 ton Henry & Wright, 2" Stroke
60 ton Henry & Wright, 4" Stroke

FURNACE—MELTING
15 ton Top Charge, Complete with Transformer Equipment

HAMMERS
4000 lb. Chambersburg Ceco Drop—1952
66" x 68" Chambersburg Cecostamp—NEW

LEVELERS
66" Guide 17 Rolls 4½" Dia.
72" Niles 7 Rolls 9" Dia.
72" McKay 9 Rolls 15" Dia. Backed up

PLANER—OPEN SIDE
72" x 72" x 18' Gray, Two Rail Heads, One Side Head

PUNCH—MULTIPLE
#2 L & A, 10' 2" Between Housings. Capy. Punch 50 holes ½" dia. x ⅝"

ROLLS—FORMING
Yoder M 2¼, 13 Stand, 3" Spindles 54" Roll Space

SHEARS—SQUARING
10' x 3/16" Pexto Model G-4120-B
10' x ¼" Niagara No. 810
10' x ⅜" Niagara No. 910
12' x 10 Ga Niagara

SLITTING LINE
36" Waterbury Farrel, 4½" Dia. Arbor

TESTING MACHINES—UNIVERSAL
20,000# Baldwin Southwark S10C Hydr.
60,000# Olsen Hydr. 72" High Column
60,000# Baldwin-Tate-Emery with Stress Strain Recorder, Range Changer, Deflectometer

TUBE REDUCERS
1¼" Standard Tube Reducer
2½" Aluminum Tube Reducer

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Induction Weld Tube Mill, Capacity Non-ferrous 2" OD by .025" wall to 8" OD by .140" wall

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25 Ton Industrial 60' Boom Crane
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2—65 Ton Whitcomb, 1—100 Ton Alcoa & 2—100 Ton Gen. Motors

STANHOPE 60 E. 42nd St., N. Y. 17, N. Y.

Lake Erie Hydraulic Press

1,000 TON—R. to L. 47"
F. to B. 32"—7" Stroke
19" daylight when ram is down.

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3¢ PER POUND F. O. B. Your car or equipment

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REBUILT—GUARANTEED ELECTRICAL EQUIPMENT

SLIP RING MOTORS
3 Phase—60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	3500	G.E.	Mill	6600/4160	240
1	2500	G.E.	Mill	2300	296
1	1800	Whse.	Mill	2300	252
1	1500	G.E.	Mill	6900/4160	444
1	1200	G.E.	Mill	2200	295
1	1000	Whse.	C.W.	2300	441
1	500	Ideal	S-4-20	4800	708
1	500	Al Chal.	ANY	2200	595
1	500	Al Chal.	ANY	2200	293
1	400	Al Chal.	ANY	2200	505
1	400	Whse.	CW	2200	290
1	350	G.E.	I-M	2200	1180
1	350	G.E.	MT-412	2200	450
1	300	Whse.	CW-1012	2200	704
1	250	Whse.	CW	4160/2400	710
1	250	G.E.	MT-414	2200	300

SYNCHRONOUS MOTORS
3 Phase—60 Cycle

Qu.	H.P.	Make	P.F.	Volts	R.P.M.
1	6000	G.E.	Unity	2300	90
1	1750	G.E.	Unity	2200	3600
1	1500	Whse.	80%	2300	514
2 (new)	1400	Whse.	80%	4160	450
1	900	G.E.	Unity	460	300
1	700	El.Mchy.	Unity	440	200
1	500	El.Mchy.	80%	2300/440	720
1	450	Whse.	Unity	2200	128
1	300	G.E.	80%	2200/440	600

TRANSFORMERS
Outdoor—Oil Cooled—60 Cycle

Qu.	KVA	Make	Ph.	Prim.	Sec.
1	300	Whse.	3	11500	440
9	333	Amer.	1	2400/4160	120/240
1	450	Whse.	3	6900/11930	460
3	833	Al.Chal.	1	13200/11000	2300/4000
3	1000	Wagner	1	36000	2500/4330
6	1500	Whse.	1	24000	480
2	3000	G.E.	3	13800	480

We have in stock a great many modern Outdoor Magnetic Primary Breakers and all types and ratings in Air and Oil Breakers for indoor use.

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2765 PENOBSCOT BLDG. DETROIT, MICH.
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TOOL & CUTTER GRINDERS
Cincinnati Monoset, m.d.
No. 91A Covel Universal, m.d.
Pratt & Whitney Deep Hole Drill Sharpener, m.d.
No. 1 Heald Tool Sharpener, m.d.
No. 2 LeBlond, m.d., 1944
No. 2A Wm. Sellers Universal Tool Grinder, m.d.
No. 2B Sellers Wet Drill Grinder, m.d.
No. 4T Sellers Tool, m.d., latest
No. 6G Sellers, m.d.
12" Gleason Spiral Bevel, Gear Cutter Sharpener, m.d.
No. 13 Gleason Cutter Sharpener, m.d., late
No. 13 Brown & Sharpe Universal, m.d.
No. 404 Barber-Colman Hob Sharpener, m.d.
Sundstrand Tool Grinder, m.d.
12x28" Landis Universal & Tool Grinder, m.d.

UNIVERSAL GRINDERS
10x24" Landis Type C Hydraulic, m.d.
12"x36" Cincinnati, md.
14x36" Norton, m.d.
14"x48" Landis Type C, m.d.
14x72" Norton Universal Hydraulic, m.d.
14x72" Cincinnati Universal Hydraulic, m.d.
18x66" Landis Universal Type C, m.d.

HONE MACHINE
No. 6 Barnes Twin Spindle Horizontal, hydraulically Reciprocated, m.d.
No. 182 Barnes Drill, m.d.
No. 854 Micromatic Vertical Honing Machine, m.d.
H1 Mocromatic Horizontal Hydrophoner, m.d.
H4 Micromatic Horizontal Hydrophone, m.d.
No. 306H Barnes Twin Spindle
No. 224B Barnes Honing Machine, m.d.

KEYSEATERS
Taylor & Fenn Horizontal Shaving, Shaping Keyseating, m.d., 1942
W-L-W Machine Keyseater, new

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By
STRUTHERS WELLS CORP.
MACHINE TOOLS

1—Betts 100" Heavy Duty Vertical Boring Mill Ser. E5159-25, 96" Table, 78" Under Rail, Table 3.6/33.6 RPM, 40 HP D.C.

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in any quantities
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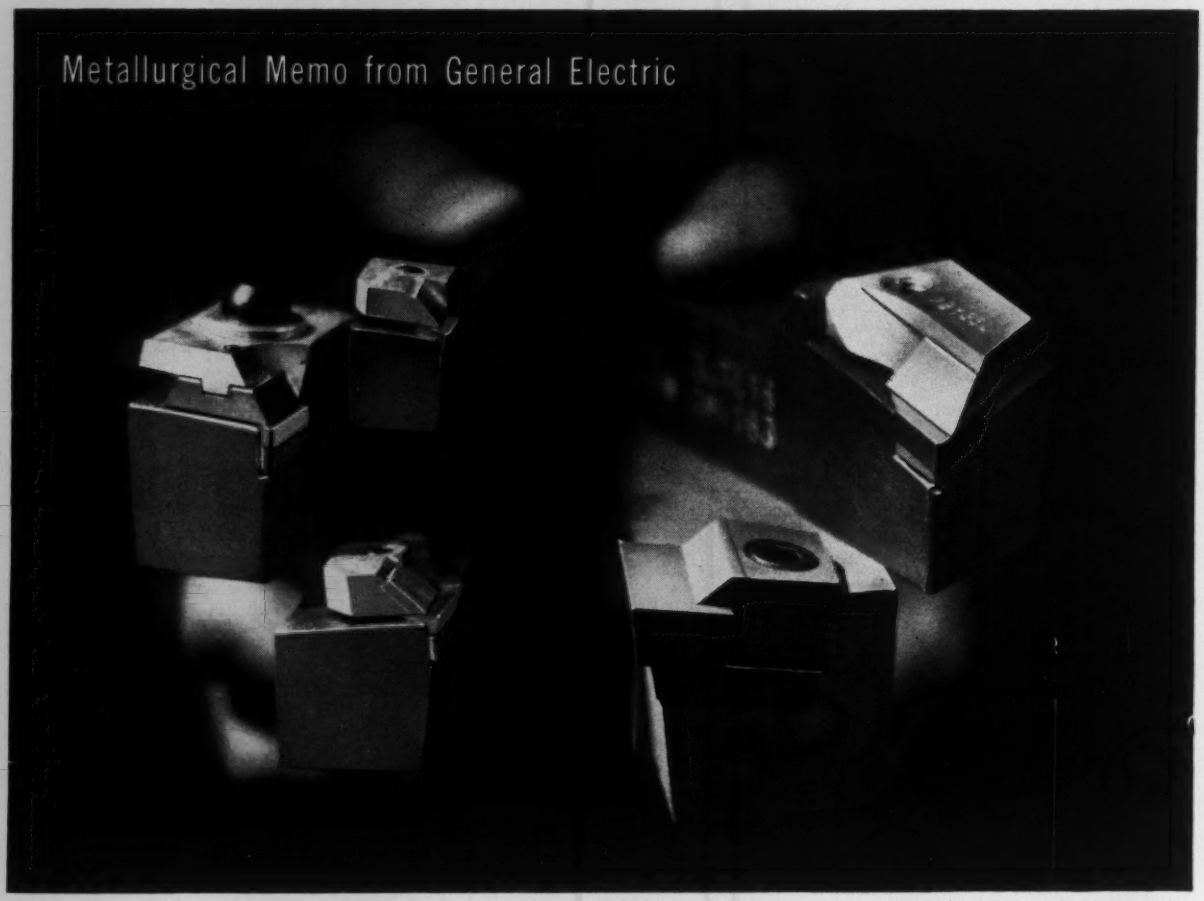

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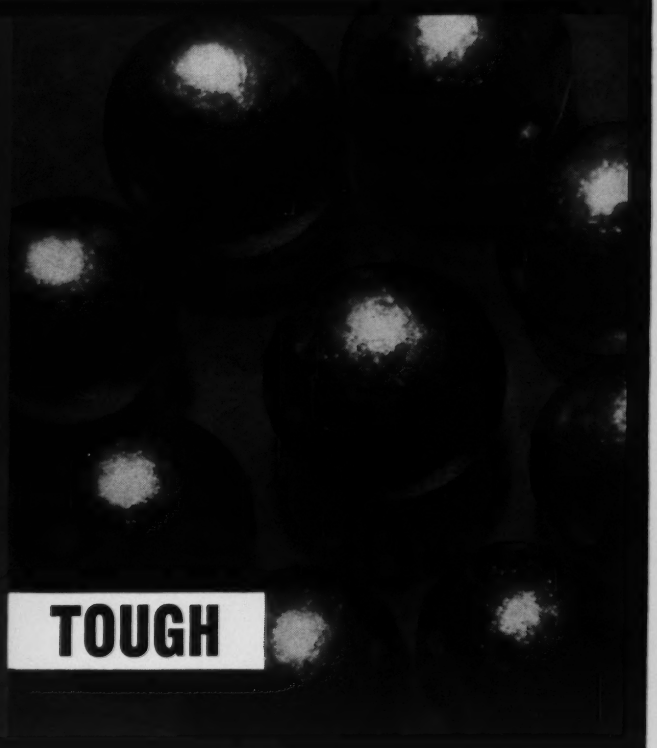

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- Eastern steel plant—Now uses Rotoblast Shot to descale steel strip, after exacting lab tests proved it better than previous steel abrasives!
- Midwest forge shop—Found Rotoblast Shot reduced abrasive costs 23% below that of abrasives previously used!
- Steel tank company—Cut cleaning costs in half (from 4c to 2c per sq. ft.) when it switched to Rotoblast Steel Shot.

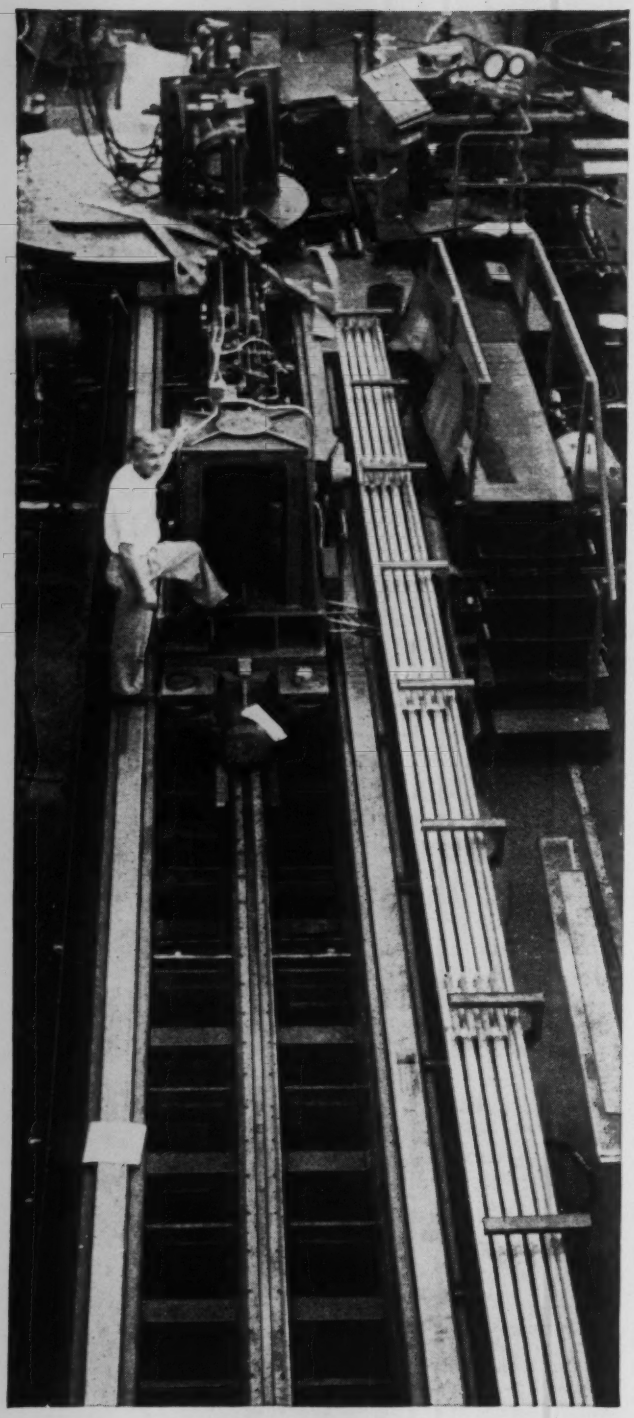
These examples are just some of the many proving Rotoblast's cost-cutting qualities! Arrange a trial in your plant! Talk to your Pangborn man or write PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Maryland.

Manufacturers of Blast Cleaning and Dust Control Equipment—Rotoblast Steel Shot and Grit. ®

*Names available on request

Pangborn

ROTOBLAST®
STEEL SHOT & GRIT



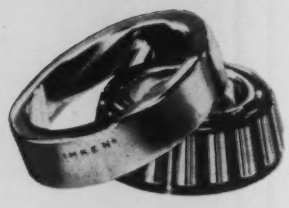
How Cyril Bath reduced friction, increased accuracy on this 50-ton radial draw former

THIS new Cyril Bath radial draw former produces contoured metal parts in sections up to 360° for industrial, aircraft and missile applications. Because the exacting work is done at low speeds, smooth starting and running are vitally important. And to *assure* smoother, more accurate operations, Cyril Bath Co. engineers switched to Timken® *tapered* roller bearings—22 in all—on the table, carriage and drives. Here's why:

1) *Timken bearings virtually eliminate friction.* They're geometrically designed and precision-manufactured to roll true. They reduce starting friction, roll smoothly and maintain their precision longer.

2) *Timken bearings have extra toughness* because their steel is the finest bearing-quality alloy steel available.

Whether you build or buy machines, you get *extra* benefits with Timken bearings—benefits that come from the Timken Company's leadership in tapered roller bearing design and in engineering service. For example, we maintain the most modern bearing research center—use testing equipment you won't find anywhere else in the bearing industry. To be sure of getting top bearing value in your machines be sure they're Timken bearing-equipped. ***When you buy Timken bearings you get . . .*** *1) Quality you can take for granted. 2) Service you can't get anywhere else. 3) The best-know name in bearings. 4) The pace setter in lower bearing costs.* The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO". *Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits.*



BETTER-NESS rolls on

TIMKEN®

tapered roller bearings